

THE IRON AGE

A Review of the Hardware, Iron, Machinery and Metal Trades.

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THE IRON AGE

THURSDAY, DECEMBER 3, 1903.

The Tindel-Morris High Duty Cold Saw.

A metal sawing machine of new design and involving several unusual features is illustrated in the accompanying engravings. The particular machine shown in Figs. 1 and 3 is designed for cutting stock up to 6 inches diameter, and is one of the smaller sizes of the line built by the Tindel-Morris Company, Eddystone, Pa. All are of massive design, to give the rigidity required in a machine capable of enduring the stresses imposed when the Tindel high duty saw blade is worked to its economical limit. For this same reason, so the makers state, the machines are geared for high power, both as regards the saw arbor drive and the feeding mechanism by which the saw is advanced against the work.

In the machine here shown, built for cutting 6-inch

four intermediate steps between the extremes of 0.5 and 2 inches per minute. Just above the feed screw, as seen in Fig. 1, is an automatic stop bar for releasing the feed mechanism at any desired point. Quick return of the saw after each cut is readily accomplished by rotation of the hand wheel mounted upon the feed screw shaft outside the main feeding gear, Fig. 1, after throwing the gearing out of mesh. Conveniently placed above the saw blade is a reservoir for lubricant, whence a rubber tube leads downward to within a short distance of the saw teeth. The driving gearing is largely inclosed by neat and substantial guards, protecting the gears from dirt and the attendant from injury.

The massive and powerful character of the design of the frame and mechanism of the machine is evident from the illustrations and the foregoing description. The

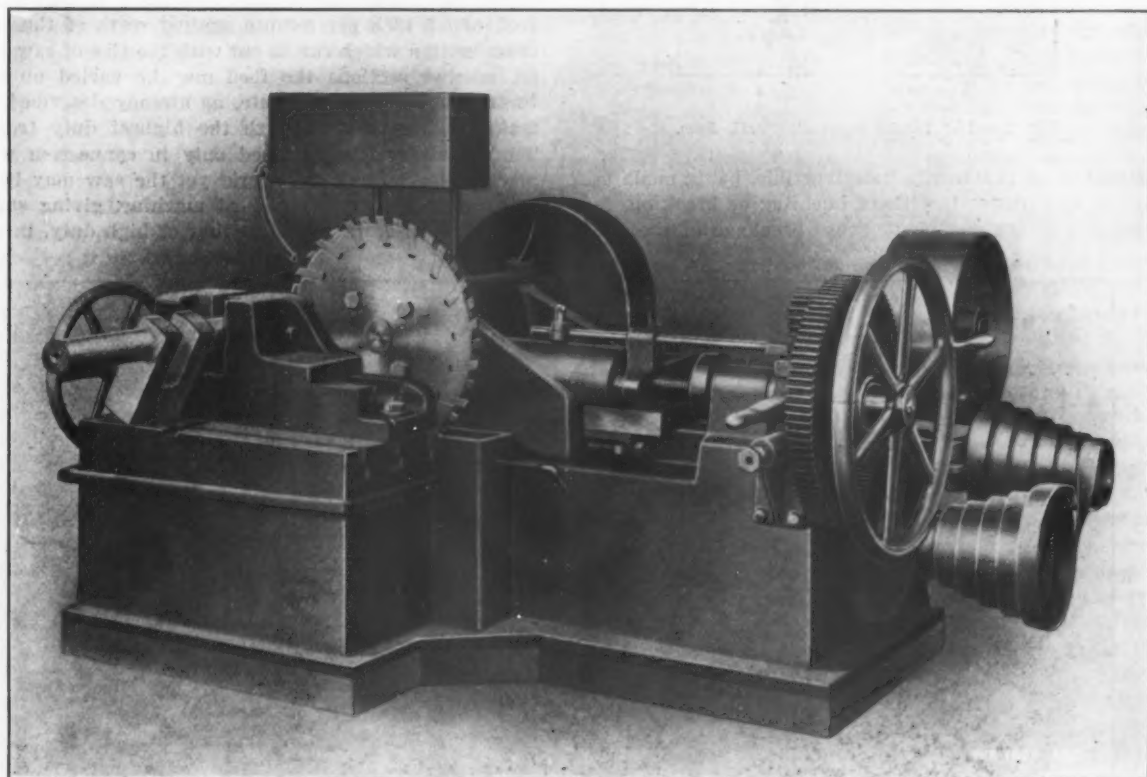


Fig. 1.—Rear Side View, Showing Stock Vise and Feed Mechanism.

THE TINDEL-MORRIS HIGH DUTY COLD SAW.

stock, as already noted, the driving pulley is 36 inches in diameter and of 6 inches face, while the gearing gives a reduction of 20 to 1 between the pulley and the saw arbor. The use of worm gearing is avoided, in order to escape the excessive friction losses and troubles commonly credited to that means of driving. A special point of the construction of the machine is the solid square lock saddle, giving the saw arbor a most rigid support upon the massive bed. The arbor is carried in a solid bearing, with phosphor bronze bushing adjustable for wear. This is believed to offer material improvement over the usual split bearing. All gearing is of steel, the teeth cut from the solid. The work is held by a powerful vise fitted with grooved and hardened V-blocks. The shape of the vise jaws and the size or length of the taper of the V-grooves may be varied to suit any reasonable special requirements. The feed is by means of a heavy screw rotated by gearing driven from six-step cone pulleys, giving as many speeds of feeding, the range covering

reasons for this heavy construction for a machine of given capacity is to be found, not in the size of the work to which it is presumed to be adapted, but rather to the saw blade which it is to drive and the power and strength required to drive that saw blade safely at the rate which corresponds to its limit of efficient performance. The saw blade, as shown in Fig. 2, is a high carbon crucible steel circular plate, with tapered teeth slots equally spaced about the periphery, the slots on one side alternating with those on the opposite face. The slots rake backward at such an angle from the radial position that the pressure upon the teeth in cutting exerts a component of its total force in tending to hold the teeth securely into their tapered slots. Thus there is no danger of loosening, and no pinning nor other means of fastening is required to keep the teeth in their places. Fig. 2 shows a blade with several teeth removed, to show the form of the slots. Attention is called to the fact that the simplicity of the teeth form makes machine shaping

of them unnecessary, permits the use of a self hardening steel and enables the realization of high duty from the modern high speed tool steels. The saw blade itself is

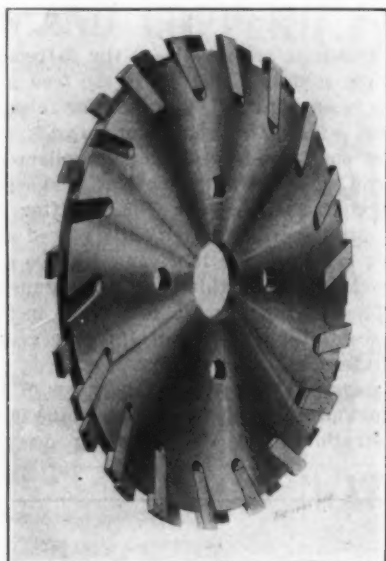


Fig. 2.—The Tindel Inserted Teeth Saw.

claimed to be practically indestructible, being made stiff enough to withstand, without buckling or breaking, feed pressures severe enough to cause breakage of the teeth.

This arrangement provides for complete clearance, nothing but the outward edges of the teeth touching the sides of the kerf, the blade disk running quite free. Losses by friction are thus practically done away with, and the machine is required to supply at the saw only the power necessary for useful work. There is the further advantage in this arrangement of the teeth that a plentiful supply of cooling and lubricating liquid may be readily fed directly to the cutting edges. It is stated that much time usually wasted in grinding of saws is saved by use of the Tindel type, and that material gains in speed, feed and endurance are made as compared to the performance of the usual forms of tempered steel saws. A Tindel saw is reported by the makers to have been run for one continuous working week, cutting on steel forgings of various grades, without stoppage for grinding.

Modern requirements in steel casting foundries call for rapid methods of cutting off risers, sprues and sink heads; heavy forging works must have means for quickly cutting off crop ends, &c. These and other similar present day demands in various metal industries require for their satisfaction sawing machines which will operate at high speeds and with coarse feeds. To meet this demand the Tindel saw is designed for a minimum lineal feed of 0.5 inch per minute against work of the largest cross section which can be cut with the size of saw in use. On smaller sections the feed may be varied up to the limit of 2 inches per minute, as already described. The makers state that although the highest duty from the Tindel saw can be attained only in connection with a machine built for heavy work, yet the saw may be used to advantage in any standard machine, giving superior results in all respects except that of high duty, in which

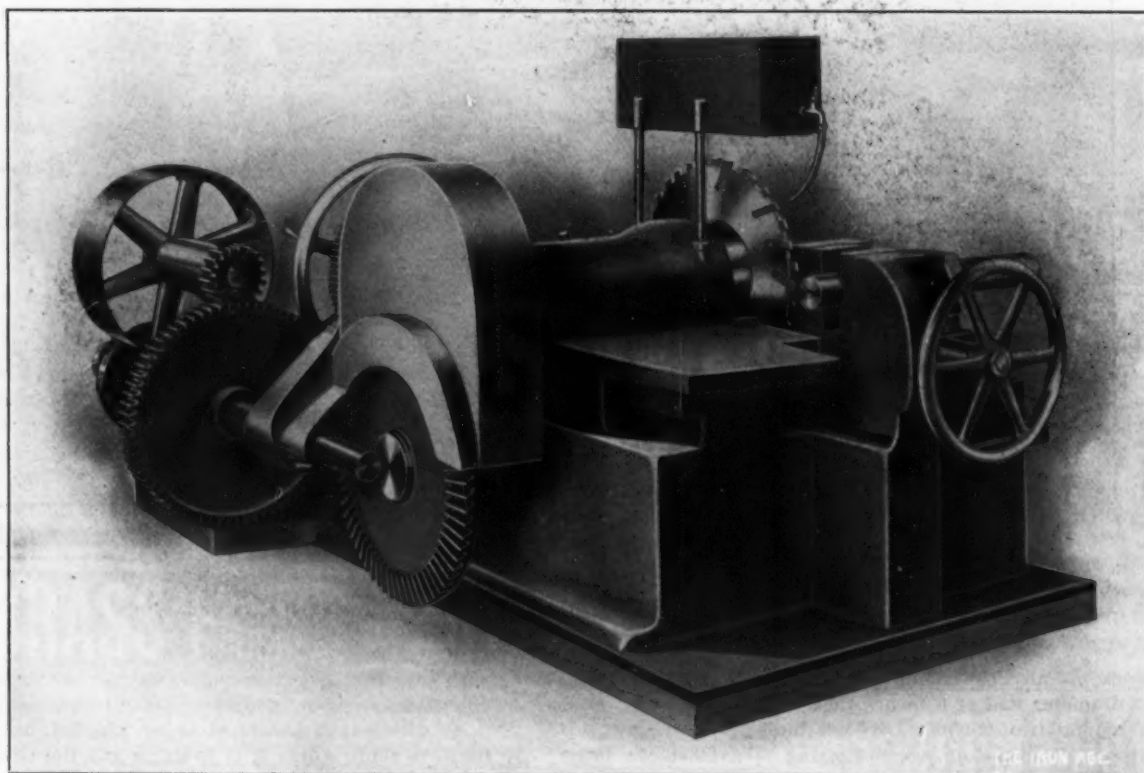


Fig. 3.—Front Side View, Showing Saw Driving Gearing.

THE TINDEL-MORRIS HIGH DUTY COLD SAW.

Broken teeth are replaced with great facility; the operation is simply one of drifting out the broken tooth by placing a chisel against the inward end in the semi-circular recess and tapping the chisel with a hammer. The insertion of a new tooth is a matter of a moment, the whole operation being very quickly accomplished.

Sticking of saws in their cuts is avoided in the Tindel saw by making the teeth slots deeper at the inner end than at the periphery, thus giving the teeth themselves an outward "set" from the plane of each saw blade face.

respect it must be limited by the strength and rigidity of the machine itself, as well as its provisions for arbor speed and saw feed.

The National Association of Thresher Manufacturers held their annual meeting at Indianapolis, Ind., November 11 and elected the following officers: President, C. D. MacDougal, Auburn, N. Y.; vice-president, G. W. Hanley, Marinette, Wis.; secretary and treasurer, S. E. Swayne, Richmond, Ind.

What Are the New Machine Tools to Be?*

BY JOHN E. SWEET,† SYRACUSE, N. Y.

It is a fact quite apparent to users of machine tools (and first among them are the machine tool builders themselves) that the new high speed tool steel calls for a redesigning of our machines if we are to get even a fair share of the ultimate possibilities which the new steel offers. I expect the machine tool builders have already the reply formulated as follows: "You just keep on building engines and leave the machine tool business to us." But that will not quite do. If no one but the engine builders had mixed in the engine business, we would have had no turbine engines, and many of the standard machine tools were originally devised by those who had use for them, rather than by the man who devised things to sell. I think the machine tool builders will admit that the machines must be redesigned; but to the most of them will this mean anything but just to make the driving elements more powerful and the machines stronger, which is as much as to say everything has been all right, and all we need to do is to change the strength and power? But have they been all right or half right?

It can be shown by figures, I suppose (I know it to be a fact by a trial with models), that a complete box is 13 times more rigid against torsion and four times more rigid against bending than the same amount of material is in the form of side plates and thin cross girts. It is probably from four to eight times more rigid than the cross girt plan in any form, and yet in the case of lathes, the whole business of whose beds is to resist torsion, only one or two builders have had the courage or audacity to adopt the box form.

All planer beds can just as well be box beds with half the cost in patterns and foundry work, and so, too, the tables which are sprung by bolting down work can just as well be box tables four times as strong with the same material, and with a saving of half the cost in patterns and something in the foundry. The whole tendency of the cut is to slide the work endwise of the planer bed; but who has ever tried putting the slots crosswise in a way to offer the greater resistance and prevent the bending of the bed by the peening of the upper surface, as now occurs, which, with the springing by bolting down the work, are the primary causes of cut ways. Some planer and boring mill cross rails are of box section in the center, but are thinned down at the ends when fastened to the housings. The most of them are three sides of a box only, or one-tenth the strength of a box, where a plain square box straight through is infinitely better and cheaper. Of course, the boxes are not to be proportioned from what is in use now, but from what is to be made to meet the new conditions. To select enough material to meet the new demands and then put the material so that it will be four times more rigid will be something like it. Housings of box section will be just as rigid fore and aft and much more rigid against side strain.

Milling machines of the planer style are constructed like planing machines, seemingly without a thought but that the conditions are identical, while they are not. If the bed of a planing machine and the table were of the same length, the weight of the table and the load overrunning the end of the bed would soon wear the top of the bed crowning and the under side of the table concave to fit, and it is to counteract this tendency of gravity to wear them out of true that the beds are made longer than the tables. With the milling machine the load is less, more of it in the middle of the table, because there is less gained by putting on small pieces end to end, and the down pressure of the big cutter always in the middle partially, if not wholly, neutralizes the tendency to wear out of true by gravity. When such a machine has side cutters or a vertical spindle, the pressure is always in the middle, first in one direction and then the other, exactly the reverse from the gravity action, and instead of the side guide of the bed being longer than the table it

should be shorter, by just about the same amount as the bed of a planer needs to be longer. Many times the sliding piece and its guides can be the same length and keep straight. The things which do not tend to wear out of true do not wear much, and the things which do wear out of true and have to be refitted are never just right but when new and when so refitted. Where a short block slides on a long guide, if the scraper marks wear out sooner along the middle than at the ends, the ends of the guide need cutting off, however much overrun it gives to the sliding block.

The draftsman dare not make a drawing of an engine crosshead overrunning the guide one-third of its length at each end; the builder would hardly dare to build it if he did, and no user has the courage to take out the guides and cut them off or cut away the surface even when he knows it would be money in his pocket, but it is the thing to do. We find that in the case of a slipper guide, owing to the effect of inertia and momentum giving a twisting action to the crosshead, it is necessary to cut away the guide so that the crosshead will overrun very nearly one-half its length before the scraper marks will show uniform wear. This, of course, is subject to modification according as the center of gravity is higher or lower, or the speed of the engine is greater or less. We are building engines with the crossheads overrunning that way and people buy them.

To get the best out of machines, they not only want to be rigid and true, but the drive needs to be powerful. In this respect a worm gear is about as perfect as can be, or cutting spur gear teeth spiral accomplishes about the same result. What appears as an objection to spiral teeth is end thrust against the shoulders, which does not amount to much, and when the shaft runs in reverse directions and end play in the journals is permissible, the journals keep in much better condition. The mention of a worm gear is like the flaunting of a red rag to some people, but it has its place and a good many more places than it has been used in. The claimed objection is excessive friction and loss of power, but the results do not seem to justify the claim. The most perfect worm gear we have (theoretically) is a screw and nut, and they do waste enormously in friction, and in proportion to what they do they wear out the most of any piece of mechanism. The most imperfect worm gear we have (theoretically) is the Seller's planing machine drive, and yet they never wear out, and hence cannot lose much in friction. In the writer's opinion two of the things which never need to have been invented are the Hindley worm gear and a machine for hobbing worm gear. Experience convinces the writer that a liberal pitch worm skewed round so as to properly mesh with a plain spur gear, or one with the teeth at such an angle as to skew the worm a little more will run more easily and last longer than the other sort. A machine driven with the worm is positive, and if there is any chatter it comes from elasticity in the spindle or the work itself.

The value of lathes, particularly those used for face plate work, is considerably improved by having large and short main bearings. They should be large to resist torsion and short to resist bending, and the ordinary face plates are ridiculously frail. To get the best of a face plate it should be box section and as large as will swing in the lathe. Owing to the rapid wear of screws the writer is convinced that a precision screw in any lathe used in manufacturing is of no special value over a fairly good one. Wearing the screw in one place while threading a few hundred pieces destroys the precision in a way which no future use will ever correct.

If the designer will analyze every detail he will find that many of the old features were not right to meet the old conditions and not half right for the new. While manufacturing is going to call for many more simple machines—that is, machines to do one thing rapidly and well—the machines which will do a variety of work will be still in demand for the sparsely settled sections of the country and the colonies will call for the country machine shop as of old. It is the hope of the writer that this tirade will bring out an interesting discussion on machine design and the capabilities of the high speed steel, for that is the object of its presentation

* A paper presented before the American Society of Mechanical Engineers, New York, December 2, 1903.

† President Straight Line Engine Company, Syracuse, N. Y.

The Westinghouse Blowing Engine.

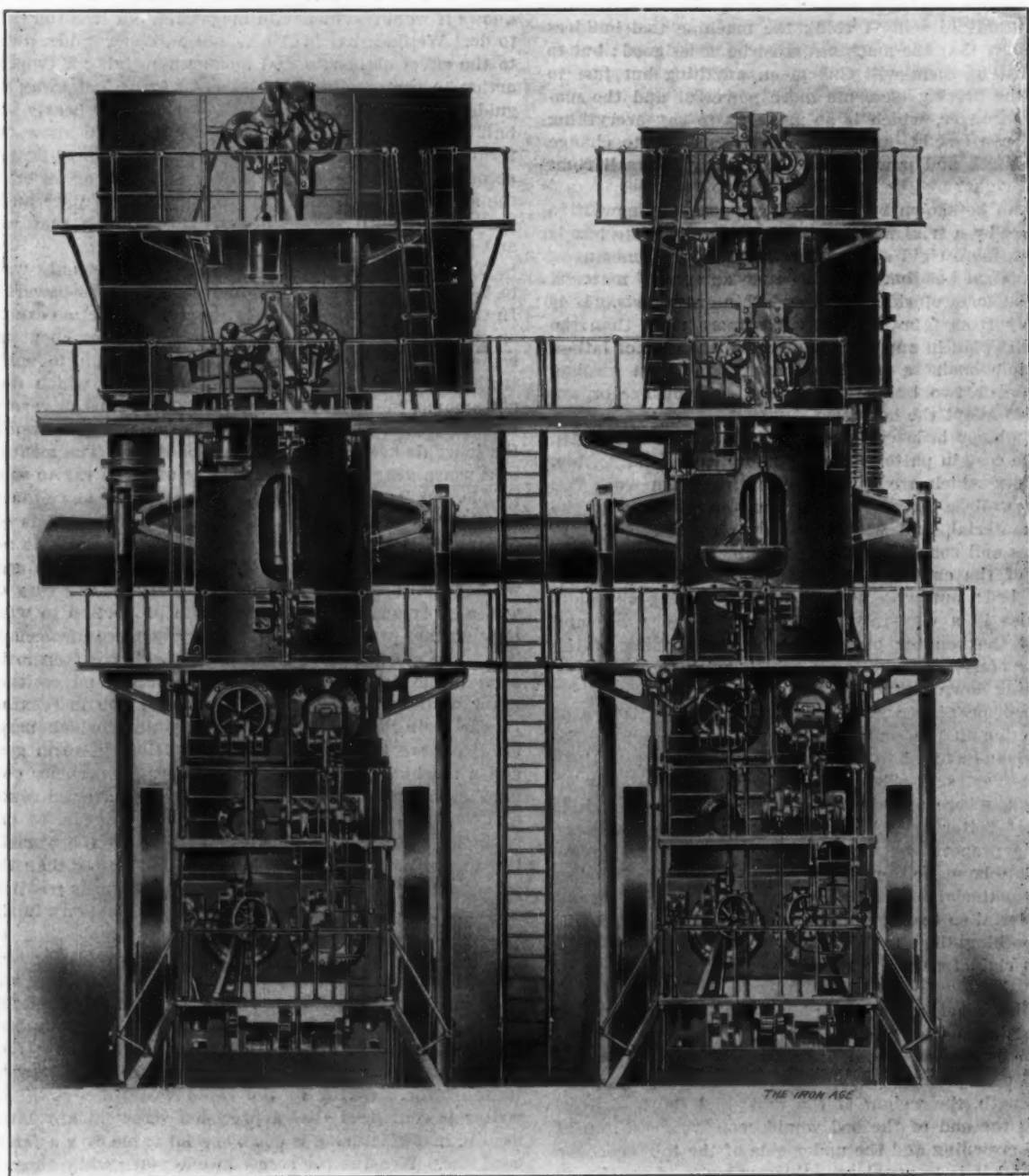
The Westinghouse Machine Company of Pittsburgh have recently built six blowing engines of the long cross head type, three of which have been installed in the plant of the Toledo Furnace Company at Toledo, Ohio, and three at the plant of the South Chicago Furnace Company at South Chicago, Ill., all under the general direction of Julian Kennedy of Pittsburgh, consulting engineer for the two companies.

These two plants are practically duplicates, each consisting of three engines ranged in line, the intermediate

50 inches in diameter and of the low pressure 96 inches in diameter, and all have a stroke of 66 inches. The air cylinders of all the engines are 96 inches in diameter. The air is delivered into a main duct leading to the furnaces, each inlet provided with a check valve. Regulation is effected through a fly ball governor, the engine operating at a constant speed, but increasing the air pressure as resistance is offered by the burden in the furnace, and *vice versa*.

Materials and Workmanship.

In the design of these engines the greatest care was taken to insure massiveness and rigidity of construction,



THE WESTINGHOUSE BLOWING ENGINE.

unit being designed to run as a low pressure engine in conjunction with either of the other two, which operate on high pressure steam, compounding being effected through a receiver in the exhaust system of the high pressure engines. The low pressure unit is also arranged to run on high pressure steam through a reducing valve. These three engines, each of a capacity equal to 2000 horse-power, are designed to run in couples, either condensing or noncondensing, two being sufficient to supply the requirements of the operation of the furnaces, one being held as a spare.

The steam cylinders of the high pressure engines are

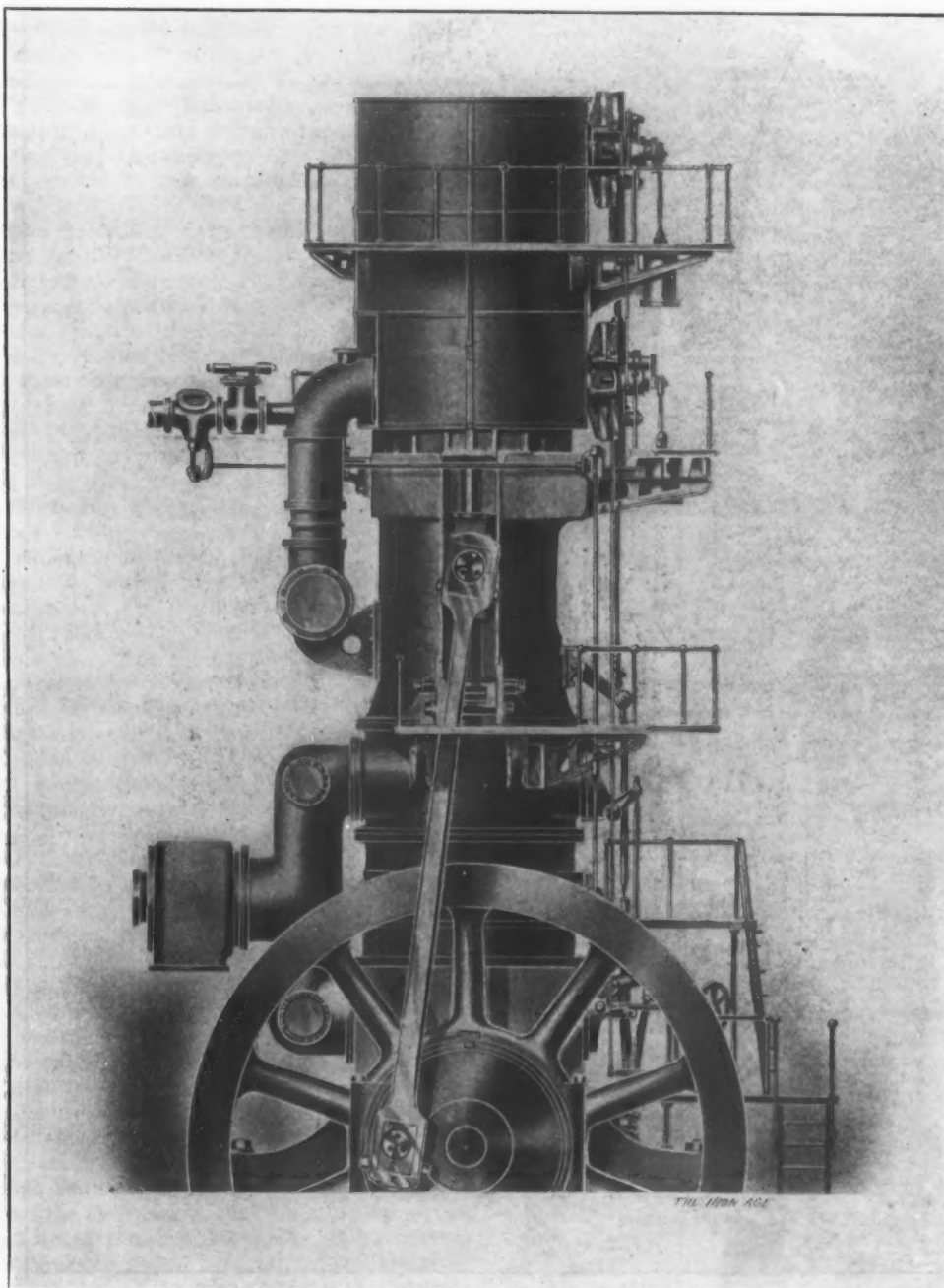
so as to fulfill without undue stress the severe and continuous duty required by the conditions of service. Materials entering into the structure of the engines were all supplied under the specifications of the International Association for Testing Materials, and thus conform to the most approved modern practice. All large and important cast iron parts were made of gun iron, melted in the open hearth or air furnace, and possessing a tensile strength of about 30,000 pounds per square inch. All steel castings were thoroughly reannealed and all important forgings were made of steel, supplied by either the Bethlehem or Midvale Steel companies.

Details of Construction.

Bed Plate.—The bed plate, which rests immediately upon the foundation, is cast in one piece. It is of massive box form, strongly ribbed, and with continuous bearing surface on the foundation, except where holes exist for removing cores and for the 4-inch foundation bolts. The bottom portion of the main shaft bearings is a removable shell; these bearings are lined with Babbitt metal, carefully peened, both bored to size at one time with a special boring apparatus to insure alignment, and afterward scraped, and provided with deep spiral grooves for

finish bored at one setting after the disks were secured to the shaft, to insure accuracy of alignment. The rims and arms of the wheels are of air furnace iron, cast in halves, finished at the joint, and are counterbored to form a collar which fits into the recess on the periphery of the crank disks to prevent side play. The rims are faced on both sides and turned, pockets being cast in them for barring. The arms are securely held to the hub by bolts and keyed to prevent turning, and the joints in the rim are securely fastened by internal links.

Crank Pins.—The crank pins are high grade steel



THE WESTINGHOUSE BLOWING ENGINE.

lubrication. Caps for shaft bearings are in one piece, having overhanging lips with scraped fit to prevent side play. They are substantially bolted to prevent lifting, and are babbitted, peened and bored to fit shaft. An ample grease box is cast in each cap.

Fly Wheels.—The fly wheels are 22 feet in diameter and of 63,000 pounds weight, each with counterbalance in the rim; they are calculated to run safely at a speed of 100 revolutions per minute. Each fly wheel hub forms a crank disk, the hub being of air furnace iron cast in one piece, faced, turned with a recess on the periphery, and is fastened to the shaft by a substantial key. The holes for the crank pins in each pair of disks were

forgings, containing about 0.50 per cent. carbon. They were ground true on centers and forced into the crank disks by hydraulic pressure, and afterward riveted. The parts which serve as bearings for the connecting rod boxes are 12 inches in diameter by 11 inches long, thus providing ample cross section and surface. The outer flange is a separate disk or cap, fastened securely to the pin by tap bolts. Axial and radial oil holes are supplied and served with centrifugal oilers.

Main Shaft.—The main shaft is of hydraulically forged open hearth steel of from 0.40 to 0.50 per cent. carbon. It was accurately turned all over and faced on the ends.

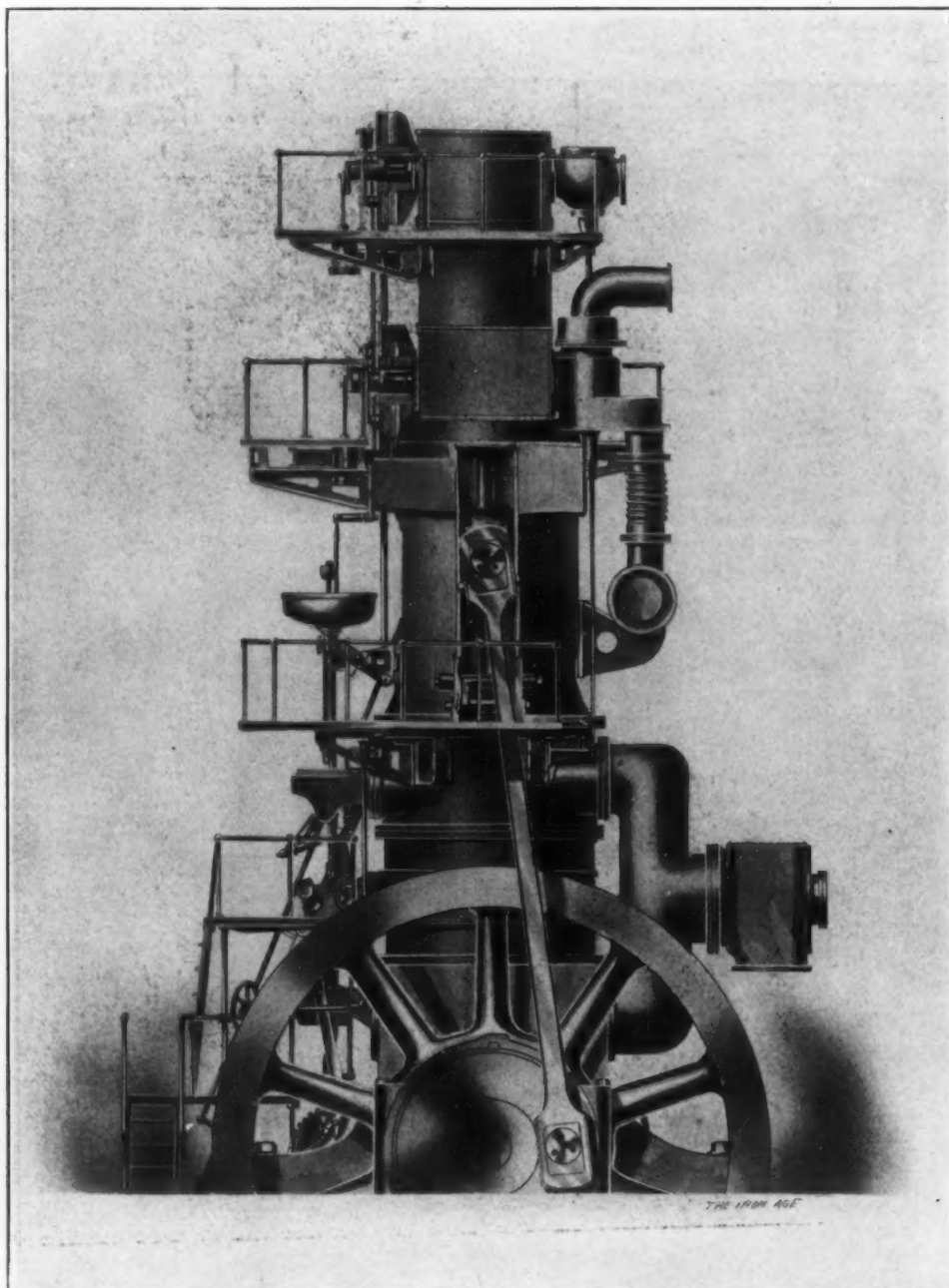
Connecting Rods.—Each engine has two connecting rods of open hearth forged steel of from 0.25 to 0.30 per cent. carbon, finished all over. They are of the solid end type, each end provided with air furnace cast iron boxes, Babbitt lined, and having adjusting wedges so arranged as to take up wear while maintaining as nearly as possible a constant length.

Piston Rods.—The piston rods are open hearth steel forgings, containing 0.50 per cent. carbon. They are carefully machined and ground true and smooth.

Cross Head.—The cross head is a steel casting of

rod fits was made with a bar at one setting. An idea of the massiveness of these castings may be obtained from the depth along the vertical center line, which is 4 feet 2 inches over all.

Methods of Connecting Piston and Cross Head.—The cross head ends of the rods are turned cylindrical and are inserted into the sockets in the cross head with a slip fit, so that each strikes the bottom of its socket. A taper steel key is driven through a keyway, out through the cross head and rod, to hold the two together, and this keyway is offset in the two pieces so that the key when



THE WESTINGHOUSE BLOWING ENGINE.

about 0.30 per cent. carbon, carefully annealed. The ends are turned to form cross head pins, each 12 inches in diameter, 11 inches long, the faces of which are supplied with disks secured to them by tap bolts. The cross head shoes are of cast iron, faced with babbitt metal, and bolted to the cross head, adjustment for wear being provided by inserting liners. Especial care was taken in designing the cross head to have an ample amount of metal, so as to provide a large margin of safety where the stresses are most severe. The castings were most carefully inspected to insure their being thoroughly sound and solid, all initial foundry strains being eliminated by the annealing process. The pin surfaces were finished true by grinding, and the boring for both piston

driven in forces the rod with great pressure upon the cross head at the bottom of the socket. By this means a positive connection is insured, there always being an excess of pressure in one direction, notwithstanding the alternations of stress in the rod due to the reciprocating action of the engine.

Steam Piston.—The steam piston is of air furnace iron, cast in box form, strongly ribbed and machined all over. A packing ring of cast iron is provided and held out against the cylinder by springs. Each piston rod has a head forged solid upon it, and the rod is passed through the piston until the latter comes against this head.

Steam Cylinders.—The steam cylinders are made of hard, close grained air furnace iron. The walls were

cast sufficiently thick to allow of reboring $\frac{1}{2}$ inch diameter larger than called for on the drawing. The exhaust box is cast separate from the cylinder and does not come in contact with the walls, thus reducing internal cylinder condensation. Lagging of the best grade of nonconducting material is provided, and the whole is covered with a steel jacket trimmed with corner angles.

Steam Cylinder Heads.—These are of air furnace cast iron, of ribbed construction, and where exposed have false covers, the intermediate space being filled with nonconducting material of the best quality. Each cylinder cover is provided with a suitable automatic relief valve. Each cylinder head casting contains four valve chambers for the Corliss type of valves.

Air Cylinder.—The air cylinder is of hard, close grained air furnace iron. The walls are made sufficiently strong to act as the main columns or frame work supporting the superimposed parts of the engine. A manhole is provided in the side 18 inches in diameter, the cover of which is made of the same iron as the cylinder itself. This manhole provides access to the interior of the cylinder to allow inspection and removal for repairs of the follower and packing ring, each of which is made in four pieces to facilitate these operations.

Air Cylinder Heads.—The top and bottom heads of the air cylinder are of air furnace cast iron. Each head is bored and fitted with two cast iron bushings or shells 27.50 inches inside diameter, in which the positively operated inlet and outlet piston valves operate. Two annular port openings with diagonal bridges are supplied in each shell. The air discharge chamber of each head is provided with a connecting pipe or elbow and the two elbows unite to form a yoke or Y, terminating in a single outlet 28 inches in diameter, on which is attached a suitable check valve. Automatic air relief valves of ample size are provided in each head, and these are set to operate at 35 pounds pressure.

Air Piston.—The piston for the air cylinder is of air furnace iron, cast in one piece, hollow and ribbed. It is supplied with a sectional packing ring of cast iron, set out by springs and secured in place by a follower ring of cast iron. It is secured to the rod in the same manner as the steam piston. The piston has two semicylindrical concavities running across it on both its top and bottom sides, which fit over corresponding convexities in the cylinder heads that contain the valve chambers. The whole outside surface of the piston head is machined, so as to reduce clearance at each end of the cylinder. Ample provision is made to prevent the piston turning on the rod.

Air Valve and Valve Motion.—These parts constitute the most novel feature of the design of the engine. They are of the Kennedy horizontal double ported piston type. Both inlet and outlet valves are 27.50 inches in diameter, fitted with cast iron spring packing rings which were carefully re-turned after cutting the joint, the latter being protected by a keeper.

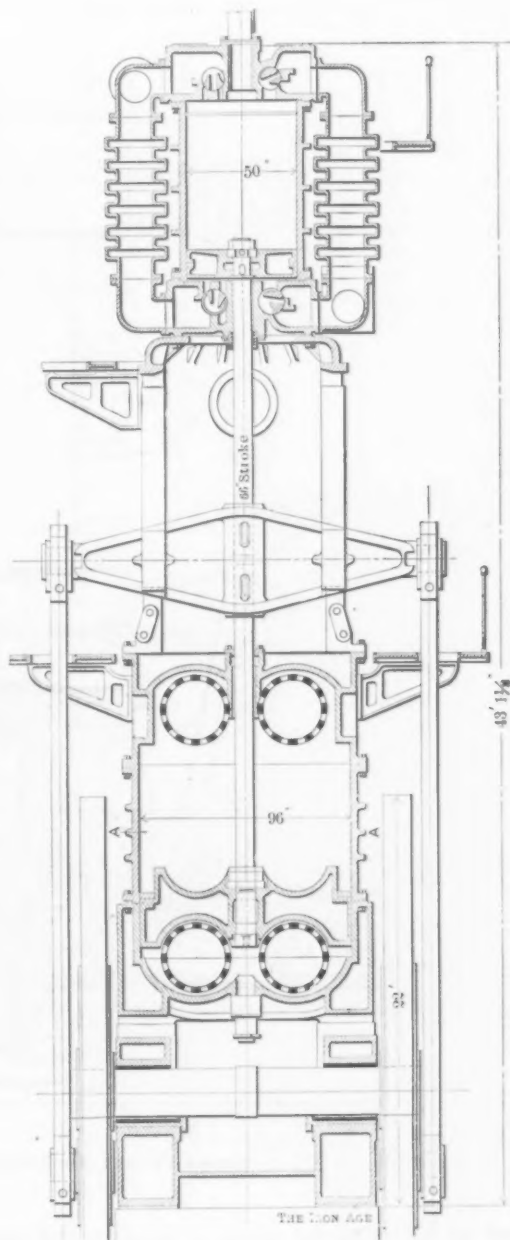
The inlet valves are operated by a simple harmonic motion through bell cranks. They open when the crank is slightly past the dead center, the piston having by this time traveled about 1 inch of its stroke, thus relieving whatever compression there may be in the clearance space. They close when the crank reaches the opposite dead center.

The outlet valves are worked by means of racks and sectors driven through a Corliss wrist plate, and are arranged so as to give a quick opening and a very long dwell when closed. They are set to begin opening at the time the pressure has risen to 8 pounds per square inch in the cylinder. There seems to be absolutely no slip to these valves, as they have proved to be very tight and to close very rapidly, the ports being entirely closed at the instant the engine passes the dead center.

This valve motion gives an indicator card at 15 pounds per square inch pressure as nearly perfect as could be attained from an ideal poppet valve, and will operate within a range of from 6 to 20 pounds pressure, with a loss of not more than 1 per cent., due to the fixed point of valve opening, such loss being no greater than that in engines having the best type of poppet valve outlets.

The whole valve mechanism is positively operated, and receives its motion from a lay shaft located in the bed plate of the engine and geared from the main shaft. This lay shaft is provided with cranks instead of with eccentrics to operate the valve motion, and the links connecting with the latter are of sufficient strength to be perfectly rigid in operation. Each link is provided with ample means for adjustment.

Steam Valve Gear.—The high pressure engines are fitted with a Corliss automatic releasing valve gear. The disengagement surfaces are fitted with square har-



Vertical Section through High Pressure Westinghouse Blowing Engine.

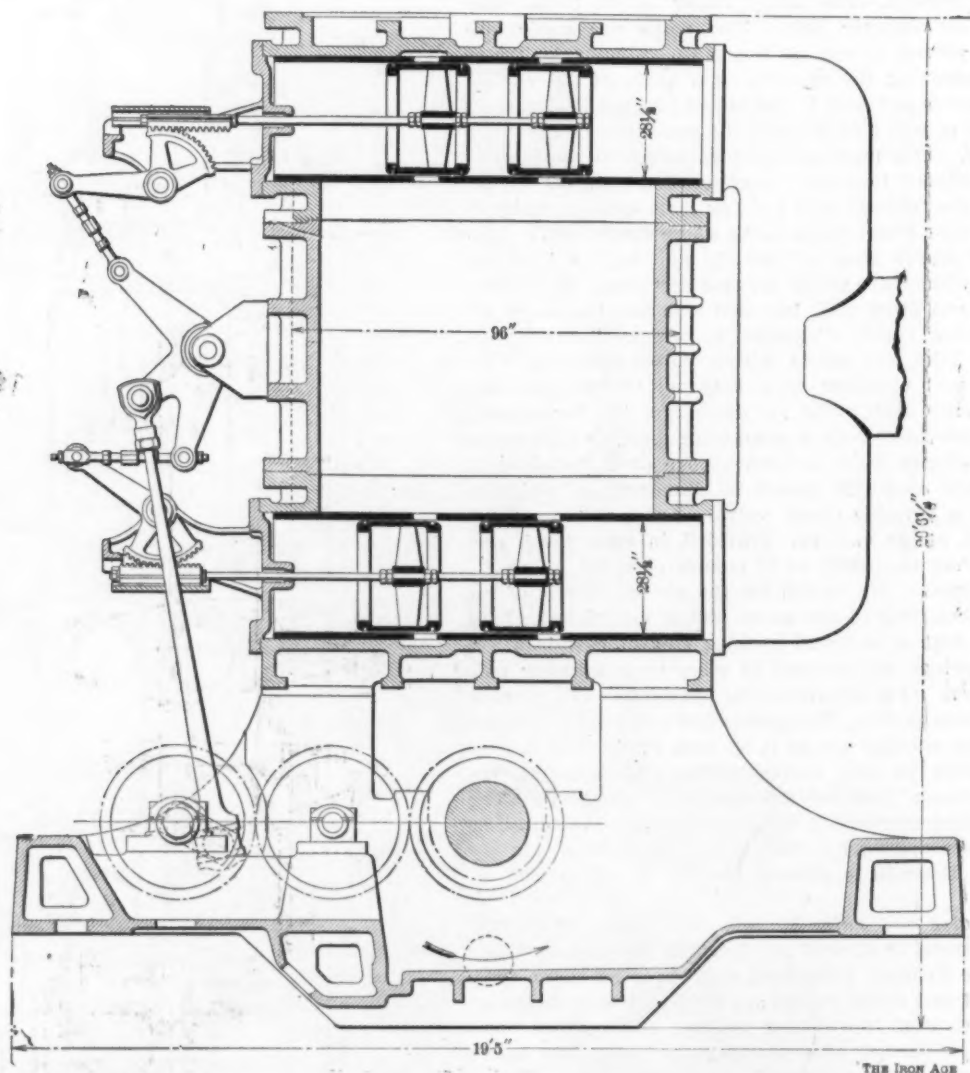
dened steel plates, detachable, so that all eight edges may be successively used. All connections are with steel rods, having heads provided with means for taking up wear and for adjusting the center to center length between journals. The steam valves are closed by dash pots. All pin connections are finished true by grinding. Each high pressure engine is provided with a governor of the fly ball type, positively operated by gearing, and has a speed adjusting device which may be shifted by hand and is of sufficient range to give a speed of from 25 to 50 revolutions per minute, all without stopping the engine. The low pressure engine is supplied with Corliss trip steam gear, adjustable by hand from zero to half stroke. The Corliss valves are made of air furnace iron, carefully scraped to their seats and accurately ma-

chined on admission and exhaust edges. The Corliss valve gear on each engine derives its motion from an eccentric on the lay shaft in the bed plate. This operates a guide plate which reciprocates vertically, and to this valve rods are attached.

Housings.—A cast iron housing, cylindrical in form, surmounts the top head of each air cylinder. These housings are cast in one piece but are united at the top only, two gates being left open at the bottom to facilitate the insertion of the cross head. A separate distance piece, securely bolted to it, closes the gate at the base. These housings supply and form the cross head guide surfaces. They are provided with suitable window open-

tem is carefully planned so as to insure perfect and constant lubrication with the least labor. Where necessary oil guards are arranged to catch drip and to prevent the flowing and wasting of lubricants.

Operation.—These engines have been in operation for about three months, and, although they have not yet run compounded, owing to the incomplete condition of the plants, they show highly satisfactory results, as may be seen by the accompanying diagrams, which were taken merely to check the accuracy of the valve setting. The steam cards were taken from the high pressure cylinder only, the low pressure engine not being as yet operated condensing. The air cards were taken simulta-



Section through Air Discharge Valve of Westinghouse Blowing Engine.

ings at the sides, for operating purposes and rendering the piston rod packing accessible.

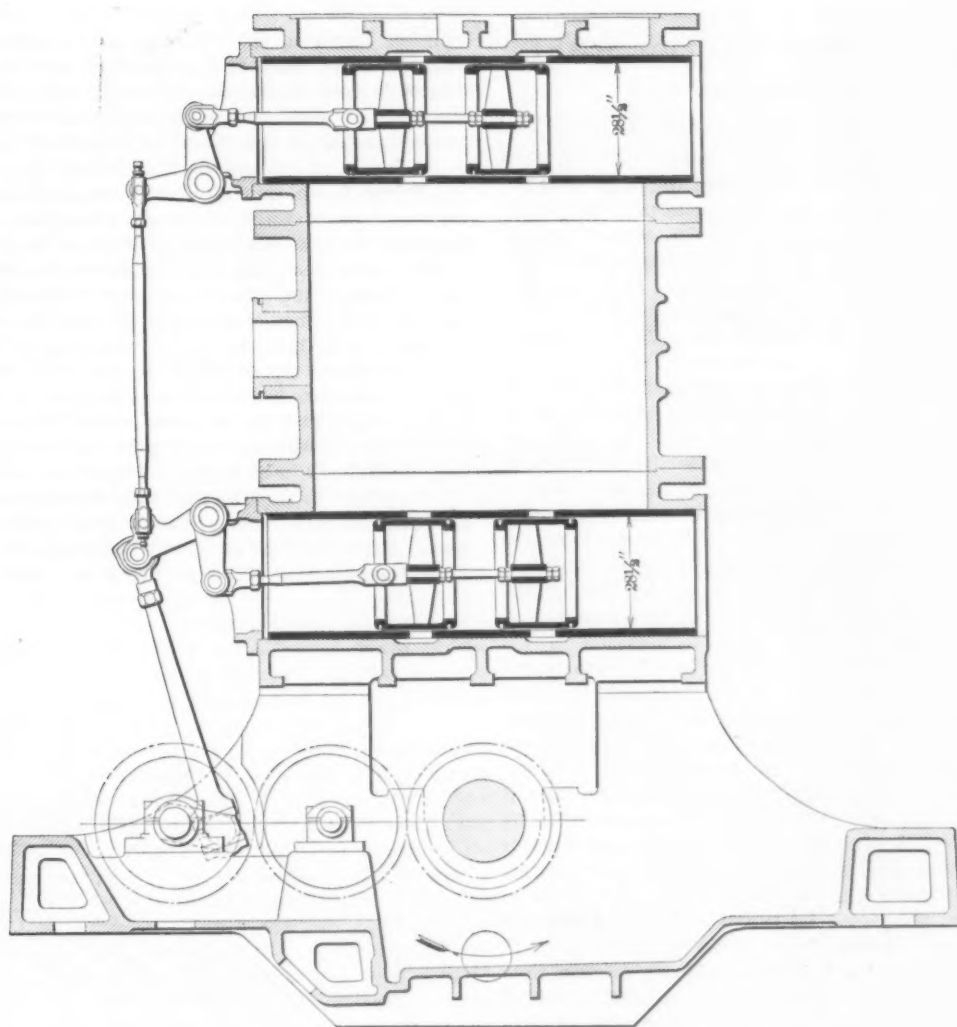
Throttle and Other Valves.—The high pressure steam cylinder is provided with a conveniently located and easily operated throttle valve, possessing an opening of 12 inches in the clear. There are provided between the cylinders and the receiver such valves as are needed to make the engines operative under the conditions or in the combinations above specified. A suitable steam reducing valve is furnished, in order to admit steam to the low pressure engine while starting and also while it may be run as an independent simple engine.

Lubrication.—Each working part is provided with oil holes, grooves and such feeding devices as will insure a proper supply of lubricant throughout all wearing surfaces. Each steam cylinder carries upon it a sight feed oil pump, mechanically operated from the valve motion. A suitable feeding device is provided for introducing lubricants into the air cylinder. Centrifugal crank pin oilers are supplied, and the remainder of the oiling sys-

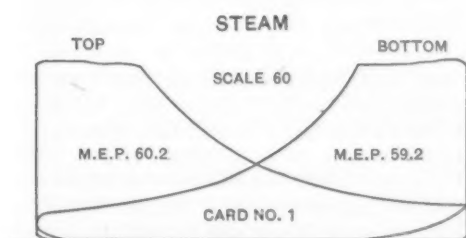
tem is carefully planned so as to insure perfect and constant lubrication with the least labor. Where necessary oil guards are arranged to catch drip and to prevent the flowing and wasting of lubricants. It must be borne in mind in examining curves on the air diagrams that both the inlet and outlet valves are worked positively. At the points *x* and *y*, where peculiar breaks in uniformity of the curves occur, the outlet valves are suddenly opened, and beyond these points the engine forces air directly into the air pipes. A number of irregularities appear in the delivery lines at points where the air cylinders of the other engines either begin to deliver air into the receiving pipes or cease to do so.

The total weight of the high pressure engines is 610,000 pounds and of the low pressure 685,000 pounds, and these weights are thought to indicate that the engines are the heaviest and most substantial of any blowing engines of their size so far constructed.

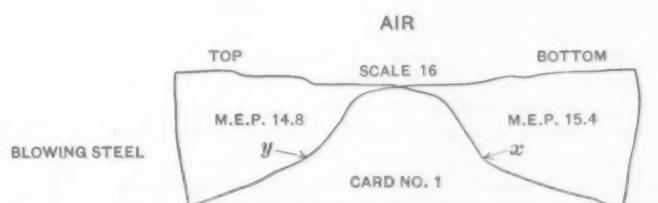
The University of Wisconsin, at Madison, will erect a chemical laboratory, \$100,000 having been appropriated by the State for that purpose.



Section through Air Inlet Valve of Westinghouse Blowing Engine.

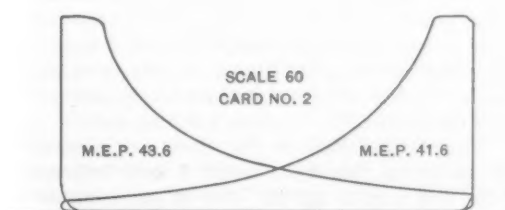


STEAM 125 LBS. PER GAUGE.



AIR 22 LBS. PER GAUGE.

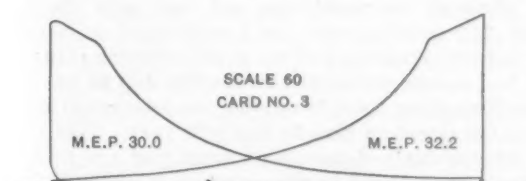
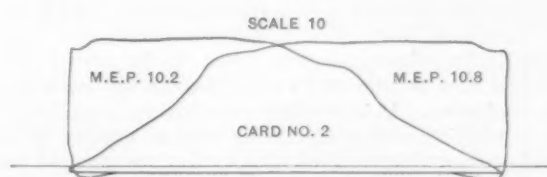
REV. PER MIN. 28.



STEAM 130 LBS. PER GAUGE.

AIR 12 LBS. PER GAUGE.

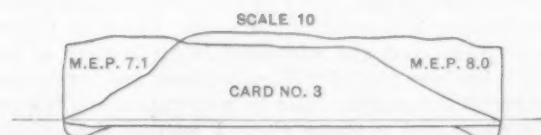
REV. PER MIN. 30.



STEAM 135 LBS. PER GAUGE.

AIR 8 LBS. PER GAUGE.

REV. PER MIN. 34.



THE IRON AGE

Steam and Air Cards of Westinghouse Blowing Engine.

Is Anything the Matter with Piece Work? *

BY FRANK RICHARDS,† NEW YORK.

The title of this paper, if perhaps slangy in form is not so in fact, and is, I think, fairly characteristic of what follows. It may be frankly stated that the purpose is not so much to convey information as it is to provoke discussion and to accumulate knowledge upon one of the unsettled questions and one of the most important which can engage the attention of this society. It is also one which can most affect the interests of its members and of those most interested with them in the safe and successful conduct of business. A perfunctory "sitting down" upon the paper is not all that any one could properly desire and cannot possibly close the case. Attention is invited to the accompanying diagram, which is easily understood. The purpose of it is to show the actual earnings of the workman, and of course also the labor cost to the employer, for any given amount of work done under either day work or piece work at different rates, the Rowan premium system and Mr. Halsey's premium plan. The amount of work done is represented by the lengths of the horizontal lines and the wages paid are represented by the vertical lines.

As the Rowan system is not in use in this country, all may not understand its basis of computation. It starts with a fair day's work, although that may not be the term used to designate it. The unit assumed is the amount or quantity of work which the man should ordinarily be expected to do in a day for the ordinary day's wage without any special inducement. The premium is earned only by the work which is done in excess of the regular day's work, and the premium earned is according to the time saved in doing the work. If double the work is done in the given time then one-half the time is saved and the man is paid one-half in addition to his regular wages. If the man does one and a half times his day's work, then one-third of the time is saved and he is paid one-third more than his day's wages, and so on. The basis of computation is thus fixed and cannot be juggled with, but the inducement constantly decreases with the amount of work done, so that whatever a man may do he can never by any possibility double his earnings. Mr. Halsey's premium plan, of course, requires no explanation here, and it will be designated hereafter as the premium plan.

Referring to the diagram it will be seen that both day work and piece work, whatever the rate of the latter, are represented throughout by straight lines. A discouragement curve represents the Rowan premium system, and Mr. Halsey's premium plan has a bend sinister. It was impossible to include Mr. Gantt's bonus system in the diagram because a part of it, the part where you do not quite earn the bonus, must be represented by an invisible line.

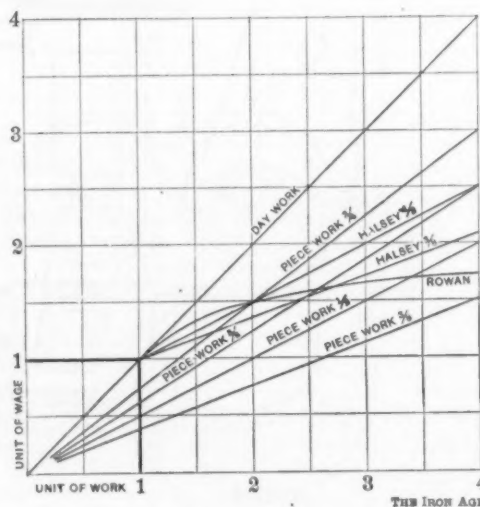
It cannot fail to strike the observer at once that in the premium plan the work which is done in the earning of the premium is straight, absolute piece work. The name cannot disguise it. The line in the diagram for the premium plan at one-half rate is exactly parallel to the half rate piece work line; the wages earned rise equally in each with equal increments of work done. So the three-eighths premium rate is parallel to the three-eighths piece work rate, and so on. If in making the premium plan bargain the proposition were made to the man to first do his allotted quota and be credited with his day's wages and that then he should go to work by the piece for the remainder of the day at one-half the day rate, that would be the premium plan in every particular.

The partial piece work character of the premium plan being undeniable, a paper whose topic is piece work must claim the right to handle it freely and without apology. The premium plan was invented by its originator 19 years ago; it was put in operation in the shop at Sherbrooke, Canada, 13 years ago, and was first brought to the notice of this society in a paper 12 years ago. The plan, I know, has been proposed and advocated in all honesty of purpose; it has been pushed with earnestness and persistency. As a result the premium plan is in operation in a few machine shops and nowhere else. I venture the personal

opinion, based on the fullest available information, that perhaps 2 per cent. of the machine work in the United States is done under the premium plan, while ten times as much is done by undisguised piece work and much more than half is still done by the day.

It is not at all apparent that there are any peculiar conditions in the machine shop which demand any different plans of wage adjustment than are prevalent in the other trades. While a knowledge of the premium plan is now widespread, the plan has not made itself appear so good a thing that any of the other trades have taken it up. It would not work with the shoemakers of Lynn, the hatters of Danbury, the glove makers of Gloversville, or the stitchers and starchers in the collar shops of Troy, for they all work by the piece, as do most of the manufacturing trades, and the ultimate possibilities of economical production are thereby secured as completely as they can ever be claimed to be under the premium plan.

We might by an effort imagine the effect of proposing the premium plan to one of the trades outside the machine shop. Let it be tried on a lot of bricklayers. Say that it is first agreed that the day's wages are earned when 500



bricks are laid, and that the premium plan begins right there. The bald proposition is, first, that if 500 bricks are laid 500 bricks will be paid for. This is so far meant to be an honest bargain on both sides. If you don't lay another brick above the 500 we will have no cause of complaint. Well, now, having agreed to pay for the laying of the 500 bricks, when the 500 bricks are laid go on and lay as many more as you can. If you lay 750 bricks we will pay you for laying 625 bricks; if you lay 1000 bricks we will pay you for laying 750 bricks, and so on. It will be very plain that under this arrangement the workmen are clearly the gainers, for if you lay more bricks you get some more money, and every additional cent you get is, of course, clear gain to you. The absurdity of this thing, when dealing with bricklayers, is sufficiently evident; are machinists so vastly different from bricklayers?

They must be different or else there are some things about the premium plan upon which I need information, and I take this way to get it. One of the inherent and inseparable conditions of the scheme would seem to be the voluntary acceptance of it by the individual workman. It depends entirely upon himself how much the man shall do after the allotted amount for the day's work is done. He may do much or he may do little, and therefore if he so chooses he may do none at all, but just be content to work along at his usual rate and just earn his day's wages. The premium plan, as I understand it, is ostensibly entirely a coaxing and not at all a driving plan; and yet it is a matter of common knowledge that in the State of New York alone there have been two determined strikes against the premium plan in the past year. This seems odd. If you don't choose to do what you are formally and distinctly allowed to choose whether you will do or not, what possibility for a strike can there be in that? Can it be that premium plan enthusiasts sometimes venture to put on to the plan some features which do not belong to

* A paper presented before the American Society of Mechanical Engineers, New York, December 2, 1903.
† Associate editor *American Machinist*.

it? I cannot imagine any other way in which a strike could be possible.

If they can tag things on and objectionably modify the premium plan they can also knock things off. The one essential safeguard of the premium plan continually insisted upon is that there shall be no cutting of rates when once established. This must inevitably involve injustice, because prices both of labor and of finished products change continually, and there must be, if justice is to prevail, sometimes a cutting of rates and sometimes an advance of rates. So far as it is possible to fix honest prices, and to maintain them there as long as it is just to both sides to do so, it can be done as well with straight piece work as with any premium plan, and is so done. For instance, I have knowledge of an establishment in the machine line, whose identity I must not disclose, where 1500 men are employed and where piece work prevails in all departments, so that 90 per cent. of the productive work of the entire establishment is done by piece work, and it may be said of that establishment that there is no cutting of rates there, just as truly as I suppose it is ever said of works where the premium plan is in use. All prices when made run for a year. They are not arbitrarily imposed by the employer or his representatives, but are the outcome of fair and free and friendly conference, and when changes of price are imperative they are adjusted again in the same way. The works are prosperous continually, and the relation of employers and employees are less strained than they were under other arrangements.

It must be evident that none of these premium or bonus or other curved, bent or defective line schemes, whatever they may claim in the way of quickening the pace of the worker and increasing the output, can be the most effective, for the reason that they offer a reduced incentive at the precise time when the need of incentive is most urgent. It is the last piece done which comes the hardest, and it is absurd to offer the man half price or less for doing it. With either of the premium plans doing its best in the way of increased output and reduced labor cost per unit, and with piece work prices adjusted to precisely the same price per piece, the inducement to the worker to increase his output still further must be greater under the piece work than under the premium plan. The guarantee that prices shall not be cut is precisely as applicable to piece work as to the premium plan. The latter has absolutely no monopoly of honesty, no assurance of price maintenance any more than the other. With equal temptation to cut, and with the same human nature in the boss, the chances of cutting will average precisely equal.

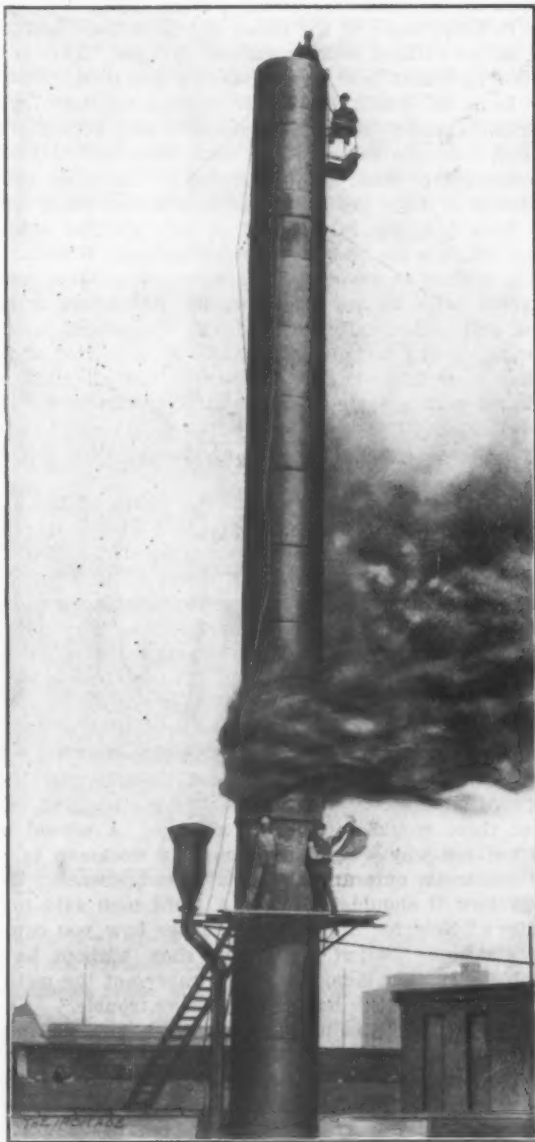
With no one having the slightest interest in pushing or advertising piece work, it is advancing on its merits as the most honest way of paying for repetitive work in the machine trade as in all others. It is worth while to note its popularity and progress, especially in the extensive line of railroad work. The testimony at the meetings of the various railroad organizations is very pronounced in this direction. At the meeting this summer of the Railroad Master Blacksmiths one man stated that absolutely every job in his shop was done by the piece. When the price could not be placed on the work to be done it was placed on the "heat." Perhaps it may not always be possible to do this in the machine shop, but whenever the opportunity arises to consider the mode of payment it should always be in order to ask: "What's the matter with piece work?"

The receiver for the New York Car Wheel Works, Buffalo, Attorney Tracy C. Becker, submitted his report to the referee in bankruptcy and to the trustee for the creditors on the 23d inst., and was discharged. The trustee reported that the inventory after the sale to Martin Carey, representing the company organized last week to purchase the plant and continue the business of the old company, showed merchandise on hand amounting to \$15,000 more than was appraised on October 20, and that amount will be paid over to the trustee by the purchasing company (the New York Car Wheel Company), in addition to the amount bid at the sale. Objections have been filed by some of the creditors to certain claims of the North American Trust Company

and other claims presented, and pending decision regarding such claims the trustee will reserve payment of dividends to creditors.

Extending a Stack While in Full Blast.

A novel method of extending a stack while boilers were in full blast was adopted by W. H. Schott, a Chicago engineer, in Indianapolis. The Century Building had a stack that reached only as high as the roof of the Stevenson Building, adjoining, the height of the new building not only interfering seriously with the draft of the Century plant, but the smoke from the latter, under certain



EXTENDING A STACK WHILE IN FULL BLAST.

conditions of wind, pouring into the windows of the upper floors of the taller building. It was out of the question to bank the fires of the Century Building plant, so local engineers were asked to devise a plan for adding 60 feet to the stack while the plant was in full operation. They decided that it could not be done; but Mr. Schott, who had put in the plant in the first place, came to the rescue. He first cut large port holes in the top course of the stack, then plugged up the opening at the top. Erecting scaffolding at the top, he set a gang of boiler makers to riveting in place extensive sheets, previously punched and rolled at the Harvey, Ill., Boiler Works. These sheets were taken up the elevator of the Century Building to the eighth floor, then hoisted by tackle out of a window to the roof, and from there hoisted to the scaffolding. In this way, in eight days 60 feet of 3-16 stack, 6 feet in diameter, were added to the old stack. The method adopted is herewith illustrated.

Modifying Systems of Management.*

BY H. L. GANTT.†

At the Saratoga meeting the papers on shop management and the allied subjects covered such a broad field that a thorough discussion of them in the time available was practically impossible, and consequently, as the writer has since found in going over the subject with members, many of the most important points in those papers were not brought out. Most of the people the writer has talked with regarded the various things advocated as individual propositions, and approved or condemned according as they saw, or did not see, how they could or could not be adapted to their works and their existing system of management. Many people apparently would like to adopt some of the ideas, but do not see how they can do so without making radical changes. This is due to the fact that few plants have in practical operation the basis on which the whole system depends for its ultimate success—namely, a complete and accurate system of getting a record of all work done each day—and the amount of time spent in doing it. In other words, a means of knowing in the office whether every order has been properly carried out or not, without actually going out into the shops and investigating. Whether the whole system as advocated is adopted or not this part is of great value to any manager, superintendent or foreman, and can usually be gradually introduced without stirring up any serious opposition. As a matter of fact, it has been the writer's experience that all good men welcome such a system and do all they can to get it in operation, and if a little time is taken, a radical change may be made by methods that are not at all revolutionary.

Referring again, however, to the views of the members regarding the methods advocated at the Saratoga meeting, it seems that few have grasped the idea that what was advocated was not a series of isolated propositions, but a system of management having a number of parts working in harmony with each other, designed first to find out in detail what the maximum output of a plant should be, and then to make it to the interest of all concerned to obtain day after day that maximum output. As an example of how diverse the criticisms of the papers were, I may quote some of the extreme ones. One man, the manager of a large plant, thought that if the methods advocated by Mr. Taylor were attempted in his plant there would be a strike at once. A second man did not see why we did not compel a workman to give the maximum output without extra compensation if we knew how it should be done. A third man said to the writer: "Now for the first time I see how you can get the maximum output from your shop without having trouble with your men, and if you carry out the methods described I don't see how you can have trouble."

These opinions, being those of well known and prominent men, are worthy of careful consideration. Regarding the first opinion, that the introduction of the methods advocated by Mr. Taylor—and it was the study of unit times that was especially referred to—would produce a strike in his works, the reply is that such study has never yet caused a strike. That it is possible to cause a strike in almost any plant by doing this work in an obnoxious way is undoubtedly true; but it is equally true that the work may be done without serious opposition in almost any plant if sufficient time and patience are devoted to it. It is realized, however, only by those who have actually done the work, how much time and patience may be needed, and a man who undertakes this work without the experience of others to guide him is apt to be discouraged and will find that his progress is extremely slow. On the other hand, if the workmen are so united in their determination that no one man can be found who will follow the wishes of the management and do exactly what is wanted without objecting to having the details observed and recorded, it would seem desirable to get such a man as soon as possible. This, however, is a condition the writer has never come across;

and, while it may exist, is certainly very rare, and probably does not exist at all in any large plant, although it may take some time and patience to find the right man. When a start has been made, and the good men begin to realize that what is being done is for their advantage as well as for that of the company, there need be no trouble provided men are allowed to realize the results of one step before another is taken.

The second opinion, that if we know how to get the maximum output of a machine we should compel the workmen to get it without extra compensation, is not in keeping with the spirit of the age. We cannot to-day in this country compel anybody to do anything. The employer must concede to the workman what he demands for himself—that he be allowed to do what he believes it to be his interest to do. In other words, when the employer has decided upon what he believes to be his interest, his only successful method of procedure is to make it to the interest of the workman to do what is wanted. It may take time and patience to make the workman realize what his true interest is and see it in the same light as the employer does, and unions may oppose it; but if the inducement is a fair one and the employee is subjected to no real hardship it is only a question of time when somebody will be found of sufficient independence to work for his own interest.

The third opinion, that these methods properly carried out should give the maximum output and be practically an insurance against labor trouble, the writer leaves for the comment of others. Suffice it to say that the writer is finding an increasing number of men that are looking at the matter in that light, and asking for information as to the best method of beginning this work under the conditions that exist in their shops.

It must always be borne in mind that everybody is suspicious of new methods, and that the only way to remove this suspicion is to show them that the new methods are going to help them in their work. If the first thing that is started is helpful to somebody, it will not be long before there is a sentiment in favor of the new system. The time keeping department and the foremen usually find the system of daily returns from the men of such assistance to them that it soon has their support, and when the graphical daily balance begins to show up weak spots the best foremen realize they have at their command an instrument which will help them to increase the efficiency of their work by enabling them to put their efforts where they are most needed.

Having thus stimulated an interest in making improvement, the value of the detail methods as advocated by Mr. Taylor will soon be realized, after which their adoption is only a question of time.

The remarks so far have been with reference to the shop, but they are equally applicable to the office, for to have a schedule of what should be done in the office each day and a graphical representation on that schedule of what was done is of great advantage to the management, and is essential to proper harmonious relations between the office and the shop. Indeed to be able to make quickly each day such comparisons as the following for the day before is quite as important as to make similar comparisons of the shop work:

What drawings should have been completed; what drawings were completed; what purchase orders should have been placed; what purchase orders were placed; what material should have been received; what material was received. It also costs but little to make readily available each day a knowledge of what has been spent in labor and material on any piece of work up to the close of the day previous.

Utilizing Waste Steam Under Vacuum.—W. H. Schott, mechanical engineer, Chicago, is installing a central heating system, to cost \$250,000, for the Little Rock (Ark.) Heating Company. A novel feature of this installation is the fact that the heating plant will utilize waste steam from cross compound condensing engines under vacuum conditions. The steam will be secured from the Little Rock Traction & Light Company, who will place steam from engines aggregating 4000 horse-power at the disposal of the heating plant, securing a revenue from what was previously a loss, and at the same time

* A paper presented before the American Society of Mechanical Engineers, New York, December 2, 1903.

† Consulting engineer, American Locomotive Company, Schenectady, N. Y.

furnishing the heat at a lower figure than it could be produced for heating purposes alone. The plant will be in operation early in 1904.

A 50-ton Whiting Electric Gantry Traveling Crane.

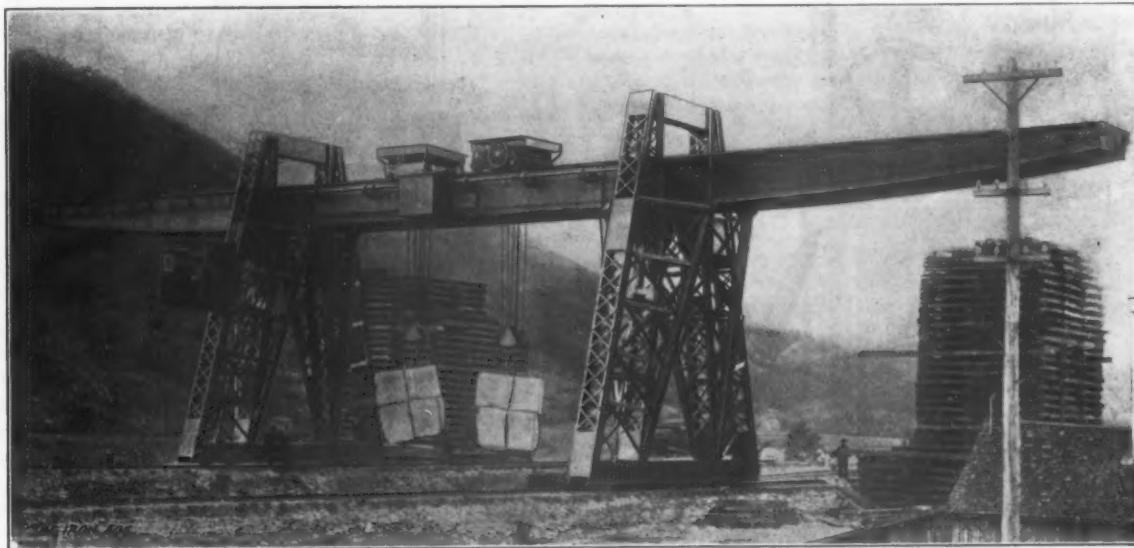
There has recently been installed in the yards of the Vermont Marble Company, at West Rutland, a five-motor double trolley electric gantry traveling crane, each trolley having a lifting capacity of 25 tons. The spacing of the truck frames supporting the bridge is 60 feet on centers, and the cantilever ends of the bridge are 50 feet long, thus making a total bridge length of 160 feet. The bridge is designed for maximum load on both trolleys at the middle of the span, providing for a total lifting capacity of 50 tons. Each cantilever arm is designed for a load of 10 tons with the trolley in extreme position. The total height of lift for each hoist is 30 feet.

All movements of the crane and hoists are independent, the driving motors being specially designed for crane service. Speeds under maximum loads are: For

together and into place under the bridge. The trolleys, by means of temporary wiring connections, were useful throughout the whole erection period in hoisting cribbing, truck frame parts, &c.

Midway of the crane span is a railroad track, its rails lying parallel to those of the crane runway. The duty of the crane will be to handle blocks of marble from cars to storage on either side, or *vice versa*. The runway is 600 feet long, so that, with the 160 feet of working width, the area served by the crane is considerable, even deducting the space required for the railroad and runway tracks. The storage yard lies adjacent to two of the Vermont Marble Company's quarries, which are at the right outside the limits of the illustration.

This gantry crane will replace seven derricks which have been in use in the yard. As each derrick required the attendance of one man, making seven in all, the labor saving by use of the crane is evident, since only one operator is needed. This one man with the gantry traveler can handle heavy loads with great rapidity, serving the whole yard and effecting material economy of space as compared to the derricks. The illustration



50-TON WHITING ELECTRIC GANTRY TRAVELING CRANE.

the hoists, 15 feet per minute; for the trolleys, 100 feet per minute; for the bridge, 150 feet per minute. All operating machinery—motors, mechanism and operator's cage—is covered and inclosed for full protection from the weather.

The bridge consists of two box girders of heavy construction, so as to resist lateral stresses. Web stiffeners and also diaphragms connecting the two web plates in each girder are liberally provided in the construction. The truck frames are built up of structural shapes and are well braced in every direction, connections to the bridge girders covering in each case a length of 17 feet. Both truck frames are open to permit passage of loads through them as the trolleys traverse the bridge from end to end. At the bottoms the truck frames terminate in built up girders, each carrying two cast steel pivoted trucks, which allow vertical movements to accommodate inequalities of the track. The truck wheels are fitted with double flanged rolled steel tires.

Each bridge girder was shipped in three pieces, the sections being so arranged as to stagger all joints which must be riveted in erection of the crane. The bridge girders were riveted together upon the ground, and the trolleys were placed upon them. The completed bridge, with its trolleys mounted upon it, was then raised from the ground by the use of 40-ton hydraulic jacks, the rise of the bridge being followed up by cribbing of railroad ties hoisted by the crane trolleys themselves. When the bridge reached the proper height, the truck frames were raised in sections by the crane trolleys and riveted to-

shows loads of about 25 tons on the trolleys, thus representing the crane under full load. The total weight of the complete crane is stated to be about 280,000 pounds. The builders are the Whiting Foundry Equipment Company, Harvey, Ill.

The Townsend-Downey Shipbuilding Company's Failure.

The Townsend-Downey Shipbuilding Company, whose yards are on Shooter's Island, south of Staten Island, N. Y., went into receiver's hands on November 30. On petitions filed last Saturday by creditors, Judge Holt, in the United States District Court, appointed Henry E. Ide to take charge of the business pending decisions on the petitions, and also enjoined the company from interfering with the business pending the receivership. The shipyard was shut down last Wednesday, and the hands had not then received any wages for a week and a half.

Counsel for the petitioners states that the failure is a heavy one. There is a bonded indebtedness of \$500,000 and an indebtedness to general creditors of \$175,000. The failure is largely attributed to labor troubles.

The petitioners against the Townsend-Downey Company are the Ansonia Brass & Copper Company, the Coe Brass Mfg. Company, E. L. Messick & Co., Ichabod Williams & Sons and A. S. Williams & Sons of Jersey City.

The management of the company seems confident of its ability to reorganize, and it is said to be the desire of the creditors to co-operate to that end as far as possible,

with due regard to the safeguarding of their own interests. A Creditors' Protective Committee will probably be formed to the latter end.

The company's statement of last January showed current assets, \$563,508, and current liabilities, \$314,831. In addition, the company have property consisting of real estate, buildings, docks, slips, machinery, tools and fixtures valued at \$1,378,411.

The Boynton & Plummer Post Drills.

The general convenience of overhead, or post drills, in allowing work of considerable size to be brought within the range of action of the machines, is recognized as of material value, and a variety of such machines are built by several makers. Boynton & Plummer of Worcester, Mass., have recently produced something unusual thus far in tools of this type by designing and building for laboratory use at the works of a large iron and steel company a post drill driven by a directly connected electric motor, as shown in Fig. 1. The belt driven machine,



Fig. 1.—Motor Driven Post Drill.

has a vertical traverse of 11.5 inches, and is reamed for No. 3 Morse standard taper drill shanks. The machine is designed to drill holes of $\frac{3}{8}$ to $\frac{3}{4}$ inch diameter; its total height, or length, is 36 inches, and the "backing" from post face to center of drill spindle is 19 $\frac{1}{2}$ inches.

The belt driven machine, Fig. 2, is designed especially for drilling large plates and for cutting boiler flues. In the latter service tubes as large as 4 $\frac{1}{2}$ inches diameter have been cut. The ratio of the back gearing of this tool is 9 to 1.

An Important Development in the By-Product Coke Oven Business.—The United Coke & Gas Company announce that the Otto-Hoffman by-product coke oven business has been leased to the Semet-Solvay Company of Syracuse. The condition of the industry makes it apparent that this course has been forced upon the retort coke oven men by the very close margins upon which the business has undoubtedly been conducted of late. The increasing number of oven plants, and the consequent large additions to the quantities of by-products

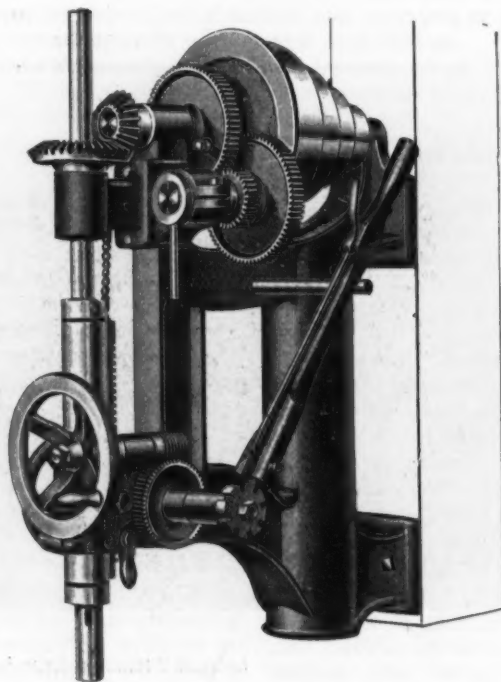


Fig. 2.—Post Drill for Belt Driving.

THE BOYNTON & PLUMMER POST DRILLS.

Fig. 2, is also of practically the same new design, involving the essential features of the motor driven tool of Fig. 1, but differing from it in that it is back geared and in various ways is the more powerful of the two.

A new feature of these machines is the ratchet and lever device for raising and lowering the spindle when quick approach or return of the drill is desired. On the feed shaft is a pinion meshing into a rack upon the drill spindle sleeve, in the usual way. On the left-hand end of the feed shaft is a hand wheel, Fig. 1, and at the right-hand end, Fig. 2, is a hand lever and notched wheel. Rapid and free movement of the drill spindle vertically is conveniently accomplished by manipulation of the hand wheel, while heavy hand feeding is controlled by means of the lever. Slow and powerful feeding is effected by use of the hand wheel at the front of the machine, driving the feed shaft by the customary worm and worm wheel.

The electrically driven drill is fitted with a $\frac{1}{2}$ horsepower Northern motor, taking current at 220 volts, direct, and running at 900 revolutions per minute. The motor armature carries a 5 $\frac{1}{4}$ -inch rawhide pinion, driving a 10 $\frac{1}{4}$ -inch gear upon the upper shaft of the drill. The drill spindle is thence driven through 6 pitch, 21 and 35 teeth bevel gears. The drill spindle is counterbalanced,

thrown upon the market, together with the necessity for working up these by-products into more salable forms, have tended to bring about this result. The development of the by-product oven in this country has shown that it is a highly specialized form of industry, covering many questions of a chemical and engineering character, and burdened with many complications incident to the working up of the by-products into valuable forms. This union of interests will make possible the great specialization and the close attention to every detail which present conditions demand. Those who have followed with interest the growth of the by-product oven in America will realize the advantage to the best development of the business which will doubtless grow out of this lease, and will expect to see the art brought to a higher state of perfection. The Semet-Solvay Company have made the American Coal Products Company of New York their selling agents for the tar and ammonia which they control from both systems of ovens.

The deficit which appeared in the United States Treasury early in November increased gradually during the month until at the close of business on November 30 the excess of expenditures over receipts for the current fiscal year stood at \$2,088,136.

Tests of Steam Turbines.

The Naval Board Reports on the Curtis and Parsons Types.

WASHINGTON, D. C., December 1, 1903.—The results of elaborate tests of turbine engines of the leading types, with special reference to their availability for naval purposes, are embodied in two reports which have been received by the Bureau of Steam Engineering from the board recently appointed to make an exhaustive investigation of the subject. The types tested included the Curtis turbine, built for the yacht "Revolution" by the General Electric Company, the performance of which was supervised by the full board, composed of Commander A. B. Canaga and Lieutenant Commanders J. R. Edwards and W. M. Parks; and the Parsons turbine, built by the Westinghouse Machine Company, as a stationary engine for the Cleveland, Elyria and Western Railroad, which was reported upon by Commander Canaga, assisted by Mr. E. N. Janson, a civilian expert of the Bureau of Steam Engineering. As the result of these tests the board strongly recommends that turbine engines be installed in one or two types of war vessels for the purpose of conclusively determining their efficiency for general use in torpedo boats, destroyers, dispatch boats, &c. Following are advance abstracts of these interesting reports:

The Curtis Turbine.

The turbines of the steamer "Revolution" are of the Curtis two-stage, compound, marine type, reversible and condensing. They are two in number, directly connected to the thrust and propeller shafting, each set of turbines driving one screw of about 4 feet 6 inches in diameter and 3 feet 4 inches pitch. This plant being the first large set of steam turbines installed for screw propulsion in the United States, it seems appropriate to mention that the general performance of these turbines, although themselves built rather in the nature of experimental appliances, was quite satisfactory, and they are well adapted as a type of motor for the transmission of propulsive power.

Aside from the ordinary advantages claimed for the steam turbine, the most noticeable feature observed was the almost entire absence of vibration or disturbing noises usually attending the running of fast moving reciprocating engines, and the slight care and attention needed while in operation. The turbine engines were easily started, stopped and reversed, the time required for each operation being only that necessary for the opening and closing of a set of valves connecting the turbine casings with the main steam pipes. Five seconds was the maximum time consumed for the operation of reversing the motors from full speed ahead to full speed back, with two men handling the gear, one to each turbine. This may, however, be done by one man at a slightly increased expenditure of time. Various runs, with corresponding stopping, backing and turning of the ship, were made at different speeds of rotation, the maximum speed of engines being about 650 revolutions per minute, and the minimum about 250. At full speed ahead the vessel readily turned either to starboard or to port in about thrice her length. Dead in the water, and starting one propeller full speed ahead and the other full speed astern, the vessel turned in her own length. Dead in the water, and with the helm hard to starboard, and then going ahead on the port propeller, the vessel turned readily to port, due to the action of the propeller race upon the rudder. Under these latter conditions it was noticed however, that the vessel ceased to turn when the wind was well on the port beam.

Running full speed ahead with both screws, and then suddenly reversing the engines, the ship was brought to a standstill in about 32 seconds; the same conditions with one screw required about 38 seconds. Similar operations were repeated with the vessel running at lower speeds, and about the same amount of time for reversing was required. While there was no perceptible vibration to the hull amidship or forward, there was an appreciable amount directly over the screw propellers, probably due to want of a more perfect balance in the propellers.

Steam Consumption.

The several trials not being carried on with a view to ascertaining any data of efficiency or economic results of steam consumption, the only information obtainable that would convey any idea regarding the economic efficiency of the plant is taken from Prof. James E. Denton's report on the Curtis steam turbines for the yacht "Revolution," in which report it is stated that at 672 revolutions per minute an equivalent power of about 1800 indicated horse-power was developed by both turbines at a steam consumption equal to 18.14 pounds per equivalent indicated horse-power. This is, however, believed to be excessive, owing to the use of the steam in two stages only. With four-stage turbines, however, the consumption of steam per indicated horse-power should be reduced well within the margin of prevailing averages for marine engines. A quite noticeable occurrence was the sudden drop in the steam pressure at full powers, indicating plainly the inability of the boiler installation to furnish the requisite amount of steam needed for the efficient working of the turbines.

The general installation of the machinery afforded sufficient room for the proper care and handling of the motors. Some of the auxiliaries, however, were, by necessity, placed in somewhat inaccessible places. Thus the air pump, circulating pumps, and main condensers were located below the working platforms, which is a natural outcome of the considerably higher position of said platforms relative to the hull, due to the fact that the center of the turbine shafts must have a much higher position than with ordinary engines. The forced draft blowers, six in number, and all on one shaft, were driven by a small Curtis turbine, running at about 2800 revolutions per minute. The generator in the electric plant was similarly driven.

The clearance spaces between the stationary and running blades on the revolving drum being made extremely small (from 0.02 to 0.06 inch), the amount of which is ascertained by a small, simple, micrometer attachment, and there being no flexible coupling arranged for between the turbine shaft and the thrust shaft, the bearing of the latter was provided with a hand wheel mechanism actuating a yoke, so arranged as to maintain the original clearances by sliding the thrust block on its sole plate, propeller, shafting and turbine drum all moving together. The wear on the thrust block being very slight, this adjustment is only rarely resorted to. The turbine shaft bearings, one at each end of the casing, run in oil, which is continuously circulated and cooled by water coils connected with the oil pump, no water circulation being used direct on the journals; water circulation is, however, used in the thrust bearing.

The exhaust from each turbine issues from the casing of the upper half of the secondary stage through a 20-inch pipe into the condenser. The condensers are of the ordinary type, with about 1100 square feet cooling surface each. They are fitted with bottom scoop injection, assisted by a small circulating pump. The air pump is a double Blake feather weight, 6 x 12 x 8 inches, placed forward of the turbines and partly below the working platform. A vacuum of 28 inches is maintained without trouble. Other auxiliaries consist of an auxiliary condenser and feed water heater, one Blake feed pump, 9 x 6 x 8 inches; one Blake compound feed pump, 6 x 9 x 3.75 x 8 inches; one Blake duplex oil pump, 2 x 0.25 x 2.75 inches; one Knowles sanitary pump, 2.50 x 1.50 x 2.75 inches; one Blake auxiliary air and circulating pump, 4 x 5 x 5 x 5 inches, and two Seabury circulators, 4 x 4.50 inches. All of these auxiliaries are placed in the engine room, with the exception of the auxiliary condenser, which is under the boiler room floor.

The boiler plant consists of two Seabury double ended water tube boilers of 94 square feet of grate surface, arranged to be operated under forced draft.

The main turbines consist principally of the casings, nozzles and revolving drums containing the bucket wheels and shafts. The steam enters at a pressure of 250 pounds through four steam nozzles, each of which supplies one-fourth of the full power of the turbine, and acts consecutively upon a series of bucket wheels constituting the "first stage," in which the steam expands down

from 265 pounds absolute to about 16 pounds absolute. It then flows through four other nozzles, to act upon another set of bucket wheels, which form the "second stage," and there expands from 16 pounds absolute to less than 1 pound absolute, with condenser vacuum of 28 inches, the work done by the steam upon the buckets being thereby nearly equalized.

Reversing Device.

Reversing is made possible in a very simple manner by placing vanes on the outer rim pointing oppositely to the ahead buckets, all inclosed in the casing of the secondary stage. A separate steam pipe leads to this part of the casing, and the steam is admitted by a separate valve. The general ease with which the machines in question are cared for and handled is undoubtedly due to the great simplicity of the mechanism when compared with the reciprocating engine. As an engine it requires but little previous "warming up," no cylinder drains to be opened nor any general filling up of oil boxes, sight feeds and wick cups, the turning on or the shutting off of the main steam supply being the principal and almost the only operation remaining. The above points are not features peculiar only to the turbines of which this report treats, but hold in common for steam turbine machinery of the various designs and makes. The space occupied, judged in the light of a casual observation, is no less, but rather more, than that required by engines of the torpedo boat class; but, as there is not the same amount of overhauling necessary, the extra space can well be spared. The weights of the turbine proper in this case are alleged to be 8.75 pounds per equivalent indicated horse-power, and are thus less than those of torpedo boat engines, which run about 11.50 pounds per indicated horse-power. The attention required and the amount of oil used is extremely small, owing to the entire absence of any internal or external oiling except the main bearings, which are automatically oiled. No frequent adjustments are required, as there are no rubbing surfaces, which may best be illustrated by the fact that the turbines in question have never been apart since first put up, covering a period equal to one and one-half years.

The points in conjecture with regard to these machines being their efficiency and their capacity to compete in economy with the best marine engines should be ascertained by more accurate tests both on land and on board ship, where this is possible. The opinion of the undersigned is that such tests are warranted, and eventually will result in the application of a motor for screw propulsion highly satisfactory to the naval service. Additional fore and aft space will certainly be required for any efficient installation of turbines as compared with the reciprocating engine installation, and particularly will this be found in torpedo boats. This fact should be well recognized and be given due consideration, so that all parts of the mechanism, but particularly the condenser and other auxiliaries, may be installed in such manner as will permit frequent and necessary overhauling from the engine room.

As the turbine is more dependent upon a high vacuum than is the case with a reciprocating engine, it is essential that the main condensers and main air pumps must be favorably placed in the ship for ready examination and overhauling. In order to maintain the requisite vacuum it is also essential to efficiency that the auxiliary appliances should not exhaust into the main condenser. It will thus be found that the auxiliary condenser, with the adjunct auxiliaries, will have to be larger than in the case of the reciprocating engines. It is an absolute necessity that both the main throttle and main reversing valves be perfectly tight, and thus it may be imperative to design a special form of valve for such purposes, so that frequent overhauling and grinding in may not be necessary.

The Parsons Stationary Engine.

The trial of the Parsons engine was made with one 1000-kw. steam turbine, built for the Cleveland, Elyria & Western Railroad. It was of the two-stage type, direct connected to the revolving field of an alternating current generator, 400 volts, 2-pole, 3-phase, 3000 alternations. It having become a commercial necessity in this

country to build alternating current generators to run on an average at 25 per cent. overload, and to make them to stand 50 per cent. for an hour or two, the turbine in question, therefore, if it were used for driving anything but an alternating current generator, would be rated as a 1500-kw. turbine, instead of 1000-kw. turbine. The general design of the turbine in question is, with the exception of various improvements in details, substantially the same as that which Parsons has for a number of years used in stationary engine practice, and with some modification has also installed for marine use. Its manufacture has been carried on by the Westinghouse Machine Company for some years past, and as a sample of the applications to which this machine has been successfully made, the four 400-kw., 3600 revolutions per minute turbines installed at the Westinghouse Air Brake Company may be mentioned; these machines have been running continuously for about four years.

The original design, having called for a reheater between the H. P. and the L. P. turbine, was the cause of the great length of this turbine (about 43 feet 3 inches, including the generator and its bearings), and without reheater the cylinders may be brought close together, and thereby considerable space saved. The reheater was not used in this machine (and it is not likely to be in others), but substituted with an ordinary receiver pipe and separator. The two turbine cylinders and the generator are all bolted down to the same bed plate, which is made of considerable depth and is quite heavy, approaching 33 per cent. of the weight of the whole outfit. This bed plate is not bolted to the foundations.

The testing of this machine was performed in the turbine department and was carried out with great accuracy, being a part of the plant specially built for the purpose of testing all turbines. Steam was supplied from the boilers of the general plant of the Westinghouse Machine Company, and entered the casing of the H. P. turbine through a series of valves. There is first an automatic stop valve, then a throttle valve which connects with a steam strainer placed between this throttle valve and the admission valve. This valve is composed of a double poppet, actuated by a piston and a small relay valve, which receives its reciprocating motion from levers connected by an eccentric through gears to the turbine shaft. The movement of the relay valve is controlled by a ball governor, and the steam is by this manner of regulation admitted in puffs, instead of continuously.

The exhaust was taken out at the bottom of the L. P. turbine and led through a 30-inch exhaust pipe to the bottom of an ordinary surface condenser. The lower part of this pipe was formed into a hot well, at the bottom of which was packed a nozzle with a by pass valve, connecting the suction pipe on the pump either direct to the condenser or to the hot well. A gauge glass, with means provided to ascertain the water level line, gave readings of the amount of water contained in the hot well when beginning and finishing the trial. The hot well pump discharged directly into either one of the two weighing tanks placed on scales to ascertain the amount of water condensed.

The circulating pump was driven by a direct connected Westinghouse Standard engine, running at about 360 turns per minute. The air pump suction was attached at the top of the condenser and connected to an Alberger dry vacuum air pump. As the name infers, no water is drawn out by this pump, but merely air and vapor. The air pump itself is composed of two tandem cylinders and is worked at a uniform speed of about 80 revolutions per minute, maintaining an average vacuum of about 27.50 inches. The near ends of the cylinders are connected by means of a pipe, the other end of each cylinder being joined to the condenser and the atmospheric exhaust respectively. A suspicion existing that the vapor discharged contained some amount of water, this atmospheric connection was coupled up with a small condenser, with the result that about 44 pounds of water were separated per hour. After passing through transformers, the current was absorbed in a water rheostat and readings obtained on the usual instruments. The

turbine was started at 9 a.m., gradually working up to full load. More than one hour being required to sufficiently heat the water in the rheostat to obtain the necessary resistance to the current, the actual trial was not begun before 10.15 a.m. The number of revolutions of the turbine was got by counting the strokes of one of the governor levers and then by multiplying same by 9 1-3, which is the ratio between the worm on the turbine shaft and the gear actuating the governor levers. The revolutions varied between 1480 and 1456 per minute.

During the second hour of the trial the turbines developed approximately 1500 kw. During the third hour the load was working down from 1500 kw. to approximately 1000 kw. During the fourth hour the turbine was running approximately at its rated capacity of 1000 kw.

It is to be noted that during the whole run of the four hours the revolutions of the turbine shaft were nearly constant, or 1500 turns, although the load was increased from its rated capacity of 1000 kw. to 1500 kw., an overload of 50 per cent. By comparing the pressure at the H. P. inlet when working under the two different loads, due entirely to the action of the governor, the above mentioned fact may readily be accounted for.

No Noise or Vibration.

The turbine ran without noise, the humming discernible being due to the generator. Its revolving parts, being accurately balanced, ran perfectly smooth, without even the slightest vibrations. All end thrust due to an excess of pressure on the steam side of the moving blades was counteracted, as is usual, by balance pistons, the difference in thrust when finally adjusted being so small as to allow the drum to be moved in its axial direction by a slight touch of the finger. Compared with a reciprocating engine there are fewer parts that need watching, and a smaller engine room force will in all likelihood therefore suffice.

The space occupied by a battle ship engine of the usual stroke and piston speed is approximately 0.75 cubic foot per indicated horse-power. The space required for the turbine (bringing the cylinders close together and eliminating the generator) is about 0.68 cubic foot per indicated horse-power, the above being figured on a basis of efficiency of 0.85 in the reciprocating engine. The weights of the turbine may be cut down to some extent by substituting steel castings where now cast iron is used—for instance, in bed plate and casing. The revolving drum and shaft are made of forged steel. The grooves containing the moving blades are slightly dovetailed; each blade and distance piece, after being dropped in place, is subjected to pressure sufficient to upset the end and thus fill out the dovetail, thereby gripping the blades. For the stationary vanes the grooves are parallel. The edges are caulked after the blades are all assembled. The free ends of the longer blades are lashed with brass wire, then soldered, forming a sort of shroud or continuous band at the outer end. The blades are made from brass material, drawn in long lengths to actual section required. They are afterward sawed off to any length desired. The bearings, having to sustain only the weight of the revolving drum with its accessories, are barely loaded to a pressure of more than 50 pounds per square inch, against from 300 to 400 pounds in a reciprocating engine; the peripheral velocity is, however, great, amounting to about 50 feet per second, against about 10 feet for battle ship engines.

Conclusions.

In conclusion, it may be said that for the purpose the steam turbines now are being used—viz., for driving electrical generators—they are admirably suited, and are undoubtedly, both as a mechanism and a heat engine—in some cases, at least—superior in efficiency when compared with ordinary steam engine.

When analyzing the figures given below it should be borne in mind that the turbine cylinders were not lagged, but simply covered over temporarily with felt roughly tied in place, and therefore the results obtained may under other circumstances be slightly improved upon. The table below will present a comparison of the horse-power in designating the capacity of motors when used

for driving electrical machinery and for ordinary or marine purposes, and will be for the turbine in question:

Kilowatts	1,510	1,019
Equivalent electrical horse-power.....	2,023	1,365
Equivalent brake horse-power delivered to the generator, at 95 per cent. efficiency of the latter.....	2,131	1,437
Equivalent indicated horse-power of a reciprocating engine at 85 per cent. combined efficiency of generator and engine	2,380	1,606
Revolutions per minute.....	1,456	1,480
Steam pressure per gauge above throttle..	149.4	146.2
Steam pressure per gauge below throttle..	148.8	101.1
Vacuum referred to 30-inch barometer....	27.5	27.83
Dryness of steam at throttle.....	0.994	0.995
Steam per hour per electrical horse-power.	14.99	15.31
Steam per hour per brake horse-power delivered at the turbine coupling, at 95 per cent. generator efficiency.....	13.29	14.54
Steam per hour per indicated horse-power of a reciprocating engine, at 85 per cent. combined efficiency of generator and engine	11.9	13.01

The advantages of the steam turbine as a motor for propulsive purposes in naval vessels not yet having been fully demonstrated, it seems reasonable, considering its efficiency when used for other purposes, to conclude that some experiments and actual installations in one or two types of vessels of the navy are fully warranted.

W. L. C.

Copper Interests of Steel Men.

DULUTH, MINN., November 28, 1903.—Articles of incorporation of the Calumet & Pittsburgh Mining Company have been filed at Duluth, and that is to be the headquarters of the concern. It is the second of the Bisbee, Ariz., group of copper developments controlled by the "steel group" to be made into a mining company. The Calumet & Pittsburgh Development Company have been organized nearly two years. They have a capital stock of \$400,000. This company will pass out of existence and be succeeded by the mining company of the same name. Stockholders of the development company will receive two and one-half shares of mining stock for each one of development they hold and will be entitled to subscribe for as much more at par, \$10 per share, payable December 26 and three months later. Should any development subscriber decline to exercise his rights these will be allotted to those that do, in proportion to the amounts they desire to pay for. It is probable that none of the mining company stock will go on the public market, as insiders will take it all.

Lake Superior & Pittsburgh Company, the third of the "steel group" development propositions at Bisbee, will be made a mining company some time next summer on about the same plan. It is now an assured mine, recent strikes of ore on the 1000-foot level having been the richest copper finds made since the same group's Calumet and Arizona made its sensational developments. It has ore running from 7 to 40 per cent. for a length of about 1800 feet, this ore carrying enough precious metals to pay much of the cost of operation. There is about a mile square of land on the property and the finds have been made near the outer edge, away from contacts. It is possible that this development will call for a larger cash payment when made a mining company than the others have, for payments on the property are to be greater.

The Calumet & Arizona Company, who were made a mining company in March, 1901, and began producing copper in a small way 53 weeks ago, have declared their first dividend, \$1.50 regular quarterly and 50 cents extra. This is payable December 19 to stockholders of record December 4. The mine is making about 2,500,000 pounds of copper monthly, and is earning more than sufficient to continue quarterly dividends of the same amount. Its capital stock is \$2,000,000 in \$10 shares, which sold at par when the organization was perfected, March 20, 1901. It is now the sixth copper mine in point of output, and is earning large profits.

Very few people outside those directly interested, and not even all of them, have any conception what the development of these three mines and their associate, the

Pittsburgh & Duluth, means to the copper world. Stockholders in all are much the same, the directorates are similar, and methods of development and organization will be identical. They are owned by men of abundant wealth to carry out any plans they see fit, and men of high mining skill. If the future can be judged by a knowledge of the men and an intimate acquaintance with what they have already done, there will never be a stock jobbing deal or a freeze out in the group. The four companies will be managed as one, and may some time be amalgamated into a single concern.

D. E. W.

A New Prentice Engine Lathe.

In the accompanying illustrations are shown a new type of engine lathe and certain of its new features not incorporated in previous tools built by the same makers, the Prentice Brothers Company, Worcester, Mass. The feature to which more particular attention is called is the system for procuring the various feeds and screw cutting pitches by means of a cone of change gears mounted upon an independent shaft at the front of the

the head stock. Special or odd threads may be cut by substitution for gears in the head.

The lathe carriage has a double apron, a feature of which is a locking device such as to make it impossible for the lead screw and the feed rod to be thrown into action at the same time. Referring to Fig. 3, which shows merely the details of this feature of the apron, the doubly slotted cam A, of the circular lead screw pattern, is fitted with an additional pin, G, placed near the outer circumference of the disk. On closing the lead screw nut the pin G forces the sliding piece B against the small adjusting screws F F in the face of the oscillating piece C. This piece C is in connection with the reversing clutch for the rod feed pinion, through the rod D and the fork E. When the sliding piece B strikes either of the screws F F the oscillating piece C is locked into a vertical position, holding the reversing clutch in its central position and preventing the rack pinion feed from being engaged in either direction. When the lead screw nut is opened the clutch for the rack pinion feed may at once be operated in either direction. Under no circumstances is it possible to throw both feeds into action at the same time. The reversing device for the rod

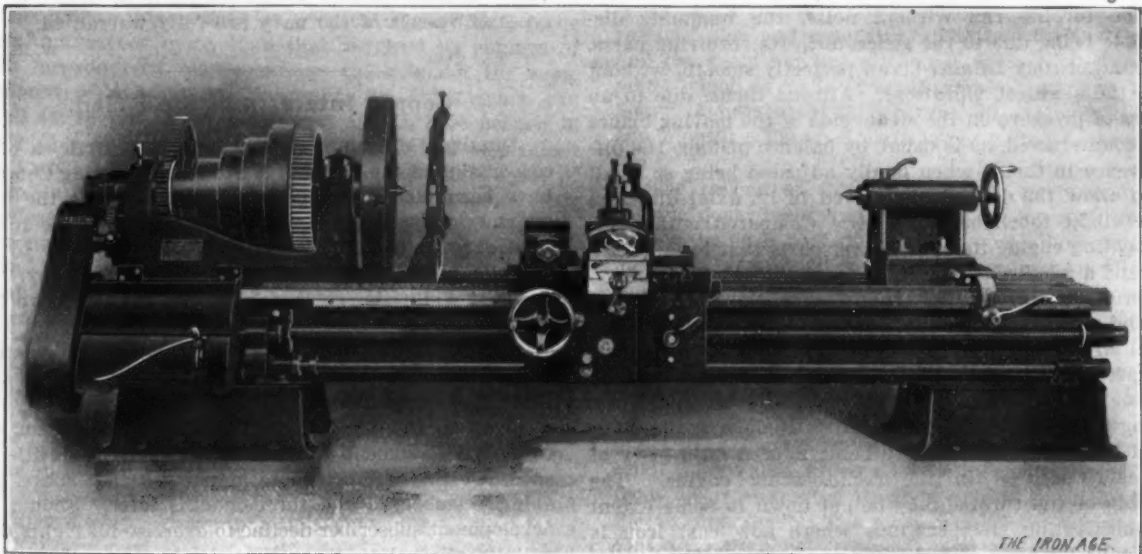


Fig. 1.—General View of Lathe, Showing Arrangement of Feed Gearing.

A NEW PRENTICE ENGINE LATHE.

bed and below the head stock, as shown in Fig. 1. The general construction and arrangement of this gear box and its attendant mechanism is shown by the drawing reproduced in Fig. 2.

Within the shield at the extreme left of Fig. 1 are four gear trains, providing for as many speeds of the tumbler shaft at the bottom of the gear cone case, Fig. 2. There are 12 gears in this cone, any one of which may be brought into action by manipulation of the sliding tumbler carrying the interchangeable pinion meshing with any one gear of the cone. Thus there are possible 48 combinations, of which 10 are repetitions, thus giving 38 different speeds. All of these are available for either feeds or screw cutting, as the gear cone shaft may be placed in direct geared connection with either the lead screw or the feed rod by shifting the sliding gear fitted at the right hand end of the gear cone shaft, just outside the gear box, as shown best in Fig. 2. In Fig. 1 is seen the shield covering this gearing, the hub of the sliding gear alone protruding within reach of the operator. In Fig. 1 the sliding gear is shown in mesh with the upper, or lead screw, gear, that for the feed rod being shown in section at the right and below. Attention is called to the absence of loose parts or loose gears, all the changes being available without removal or addition of any detail. Feeds vary between the extremes of 0.5 to 24 per inch, as marked upon the index plate fitted to

feed is in the apron, as already intimated. The lead screw is 2 9-16 inches diameter and the thread is of 2 pitch.

Pacific Coast Trade Prospects.

SAN FRANCISCO, CAL., November 20, 1903.—The weather has changed from fine, clear and dry to steady and continuous rain, and the agriculturists and business men all over the State rejoice. It is true that this does not insure a harvest, but it is a fine indication of a good year, and as we have had two short crop years there is very little doubt that we will have a big one this year. At any rate, the immediate effect is good, and though active business is not expected at this season, what there is is stimulated by the rain, and projects that would have been laid aside are proceeded with. The rain is especially grateful to the mining interests of the State, and has made the representatives of those interests who have been assembled in convention in the city this week go home to their constituents feeling that there was a good year before them. Water is the great need of mining as well as agriculture in this State, and all the dependent interests are immediately benefited by rain. This of itself stimulates activity in our foundries, among agents of mining machinery, pumps, pipe and all descriptions of iron, steel and hardware needed in mining sections. It is

also beneficial in many sections where the oil industry is carried on and which need water as well as any of the mining sections.

There is a lull in contracts for new buildings in which structural steel is the main feature, but there are enough of them unfinished to keep manufacturers busy for many months. Most of the material is coming from abroad, or has already come to hand, but occasionally a local foundryman carries off a small contract. This is, however, but seldom. The foreign manufacturers have had the business for the past 18 months. There does not seem

the "Wayfarer," from Antwerp, 5742 steel beams, 152 steel bars, 1120 steel angles, 1596 bundles of iron, 22,052 bars of iron and 95 packages of steel. The Panama steamers have had a moderate amount of hardware, pipe, &c., among their cargoes. Arrivals by rail have been of moderate volume in most of these lines. As the year has been a good one, stocks at the close will be of only ordinary dimensions.

The export trade from the port of San Francisco has been of medium character in iron and steel goods, consisting principally of machinery, pipe, bicycles and hardware.

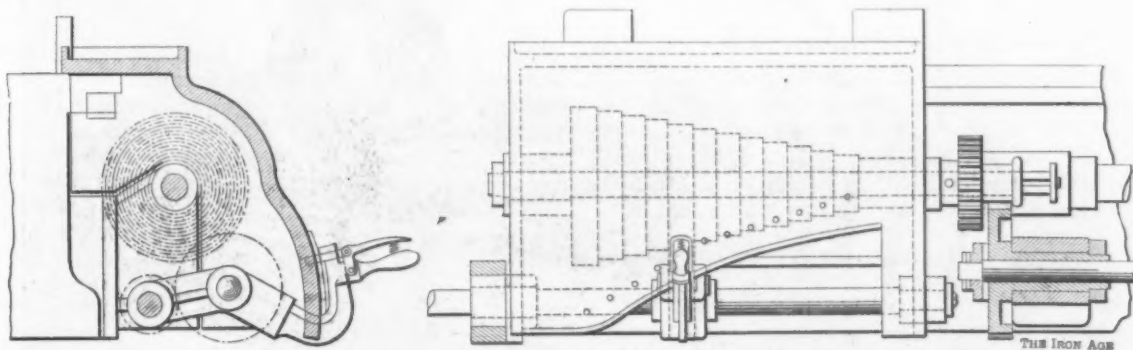


Fig. 2.—Gear Cone Mechanism and Connections.

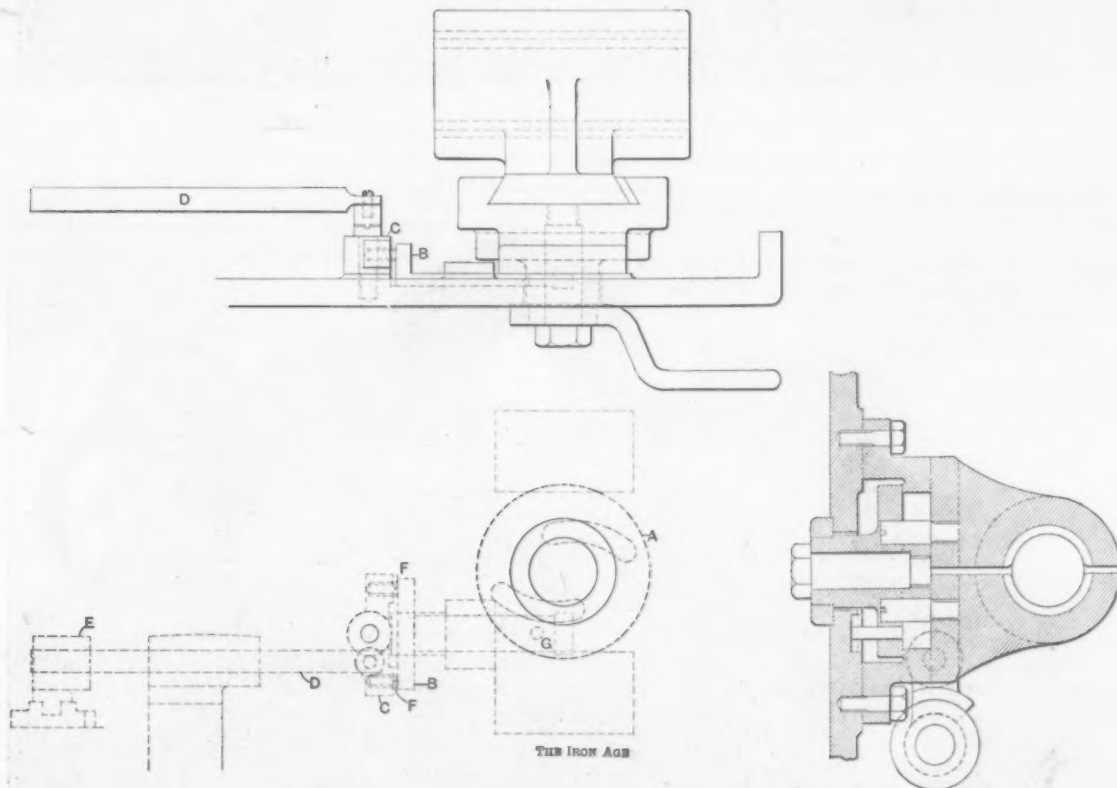


Fig. 3.—Interlocking Device for Rod and Screw Feeds.

A NEW PRENTICE ENGINE LATHE.

to be much reason why our American manufacturers should not secure this trade, now that the Eastern demand seems to be slackening. Here, as in other parts of the United States, the demands of the workmen and high prices of material have made many hesitate at putting up great buildings, for the reason that they would not pay, but if structural materials and labor come down there is no doubt, as far as San Francisco is concerned at least, that the activity prevailing for the past year will be maintained.

There have been some heavy iron and steel imports in the past two weeks. The "Neully," from Rotterdam, had 600 tons of pig iron and 180 steel plates; the "Procyon," from Glasgow, had 1010 tons of pig iron and 1550 tons of ferrosilicon; the "Babin Chevaye," from Antwerp, 2429 packages of iron and 13,244 packages of steel;

Most of these goods were Eastern shipments in transit. There have been large shipments to the Orient. The last steamer, the "Korea," had a cargo valued at over \$400,000, of which a very large portion consisted of goods of this description, principally for Japan. There were also some considerable shipments for Korea. The last Australian steamer, the "Sonoma," had also large shipments of similar goods, but the export of bicycles thither has fallen off. The pipe goes mainly to Honolulu, with some to Mexico and Central America.

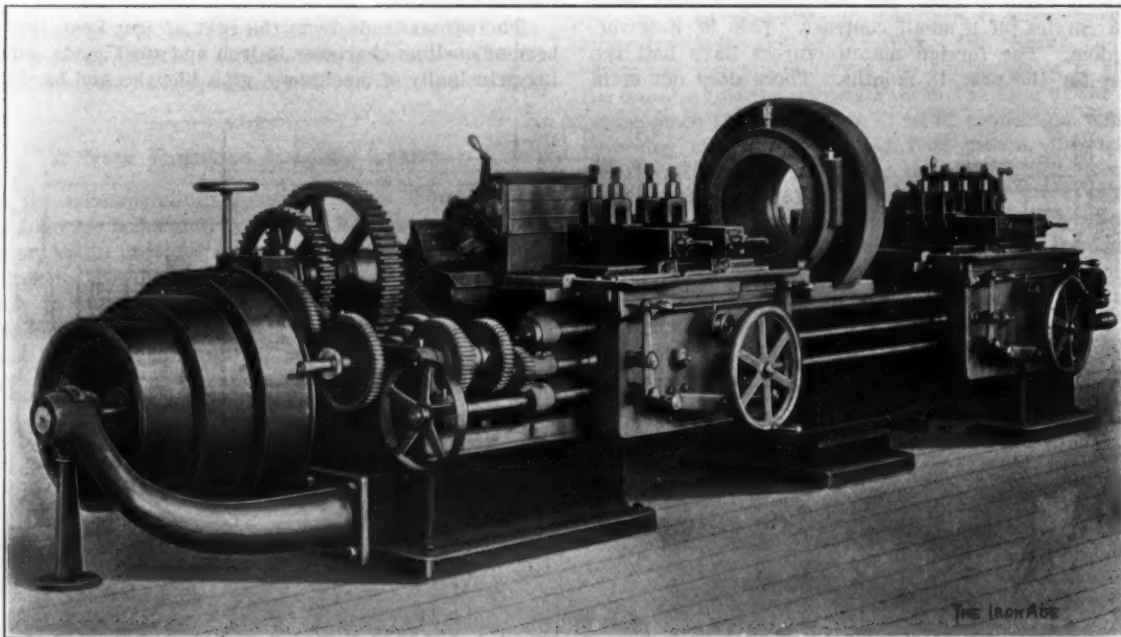
J. O. L.

The *Iron and Steel Metallurgist* is to be the name of the *Metallographist*, hitherto issued by Albert Sauveur and Jasper Whitney of Boston. The new magazine is to be a monthly publication.

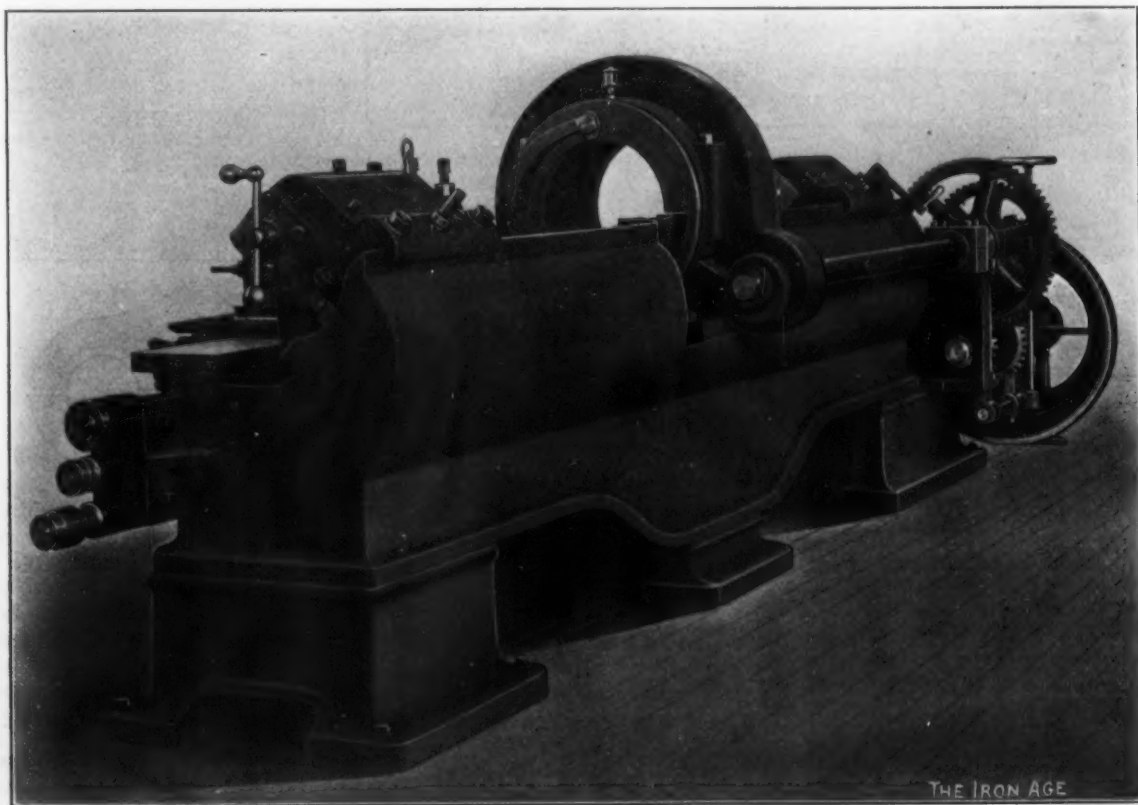
The Lodge & Shipley Axle Lathe.

In what they name their new rapid reduction double head axle lathe, the Lodge & Shipley Machine Tool Company of Cincinnati, Ohio, have a machine which is entirely new in design and possesses several novel features.

of distinctly new and unique design, providing special ways set on an angle of 45 degrees for the tall stocks. In this way the upward pull or stress on the tall stock is received by the bed and not on bolts. The tall stock spindle or slide is dovetailed directly into the tail stock, and to increase its rigidity is gibbed at both top and



Front View.



Rear View.

THE LODGE & SHIPLEY AXLE LATHE.

The massive construction portrayed in the accompanying engravings gives evidence of sufficient strength to withstand any strain that may be placed upon the machine through the employment of the highest powered tool steels. The rapid reduction idea is kept in view throughout the entire design.

It will be noted from the illustrations that the bed is

bottom. The driving head will take 15 inches through the opening.

Each carriage is provided with two tool rests, and as many more as desired may be used, as they can be placed in any position along the entire length of carriage. Each carriage has a rapid power traverse motion in either direction, thereby enabling the operator to bring the tool

to the proper position without the delay of slowly moving the mechanism by hand. The carriages are also fitted with safety devices and automatic stops, which can be quickly adjusted to suit the requirements.

The feed range is very wide, allowing for six instantaneous changes. These may be obtained as follows: 32, 16, 11, 8, 5 and 3 to the inch. The feed gears are made of steel and the apron drive is very powerful, as the lead screw is cut 1 inch pitch and double thread. In accordance with the general purpose of obtaining strength and stability, the rack and rack pinion are discarded.

The cone pulley, it will be observed, has three steps, which range in diameter from 20 to 30 inches and have a width of face sufficient to accommodate a 6-inch belt. The driving gears are of liberal dimensions and coarse pitch. The bull wheel is 30 inches diameter by 4 inches face and 2 pitch. The countershaft has two speeds. The lathe is double back geared, with ratios of 6 to 1 and 21 to 1, thus giving 12 spindle speeds.

By the use of a special geared speed variator having eight changes of speed and an 8-inch pulley, 16 spindle speeds can be obtained.

An idea of the massiveness of the machine may be formed from the fact that with countershaft, pump and pan it will weigh from 18,000 to 20,000 pounds. As an illustration of the capabilities of this lathe may be cited the statement of its makers that a locomotive tender axle has been picked up, dogged, turned from rough to finished size, and removed, all in 28 minutes' time, the work requiring the attention of two men.

Lake Superior Mining News.

DULUTH, MINN., November 30, 1903.—Affairs on the iron ranges are moving very quietly. Predictions as to the coming year are frequent and are not pessimistic. One large independent producer, it may be remarked, says the year's total output will be under 15,000,000 tons, but this is as absurd as some optimistic predictions that have in times past emanated from mercurial sources. No one believes the output of 1904 will equal that of this year, however, and vesselmen and mining companies are preparing for a slow season. Still contracts for new lake ships are being made, and the yards of the great lakes will turn out more shipping than was to have been expected a few months ago. The past week a contract was let by the Western Transit Company for a very large and fine package freighter; and the 560-footer for A. B. Wolvin of Duluth and associates has been laid down in Lorain. The first work on actual construction of this ship took place this week. The hull has been much modified from original designs, and will present new and interesting features. This ship is to be 62 feet longer than anything afloat on the lakes, about 100 feet longer than the typical steel ship of to-day, and many problems entered into the designing. Speaking of shipping, a report is out that the Gilchrist fleet is to be taken into that of the United States Steel Corporation, adding 72 vessels, most of them modern steel freighters, to the Steel Corporation's line. But there is nothing in the story.

The first shipment of ore from the International Harvester Company's mine, at North Freedom, Wis., the Baraboo district, has been sent to Chicago. The mine has now been closed for the winter. It will probably reopen again quite early in the new year. It has 25,000 tons on surface, mined in process of development, and some \$150,000 has been spent in this development. About 140 men have been let out for a short time. Jos. Sellwood of Duluth is general manager of this property, with C. T. Roberts, late of Crystal Falls, as superintendent. Messrs. Whiteside and La Rue of Duluth and Grothorst of Baraboo are fee owners here.

Half a dozen other companies are interested in the district and are exploring. These include the Iroquois Furnace Company, Chicago; the Pewabic Mining Company, Iron Mountain; officials of the Chicago, Milwaukee & St. Paul road; officials of the late Union Steel Company, Donora, Pa., and several individuals. The Iroquois Company, controlled by Rogers, Brown & Co., are down 200 feet with their shaft, and expect to be

hoisting ore shortly. H. B. Sturtevant of Duluth is general manager here.

In the L'Anse region, west of Marquette, where M. L. Fay and associates are exploring, the situation looks well. Another company is being organized and will explore a large tract on which there is ore. Several drills are to be operated by this concern.

At Iron River, Menominee range, there is considerable activity this winter, in spite of the fact that so many mines have closed and most of the explorations have been abandoned. Close to Iron River, Beta and Nanaimo are under exploration by the Pewabic Mining Company. A power plant has been installed, and sinking and drifting are under way. At Riverton, of the Oliver Iron Mining Company, work is not pushed, but is moving steadily. Iron River itself flows over the ore body, and it is the company's intention to find what they have, in order to determine as to the diversion of this stream, which will be a work of much cost. Two years ago this company turned the same river from over the Dober ore body, near by, and they realize the difficulty and cost of such work. If the Riverton ore deposits are big enough the river will doubtless be attacked before long. It is reported that explorations are quite satisfactory. The Dober mine is closed for this winter, at least. It had been kept free of water, but now the pumps are coming up. A blower is going in by which the mine is to be unwatered when occasion requires. A large new hoisting plant is nearly ready for use here. The same corporation are working on the McGillis exploration, and are reported to be quite encouraged at what is coming out. A large lens of ore has been opened into. Caspian and Baltic of Pickands, Mather & Co. are both at work. At Caspian they have sunk a shaft 300 feet deep, and are opening the ore body. The shaft is to be sunk to the 400-foot level, and the mine will be in shape for a large production next year. Baltic is taking on more men. The company will next summer strip the surface and convert the mine into a milling proposition.

Water still troubles the management of West Vulcan, at Norway. Pumping has increased from 600 gallons a minute to 2200, and the water does not drop much. Additional facilities for forking out the flow are going into the shaft.

At Bessemer, on the Gogebic, they have abandoned Jackpot mine, and are taking out everything, preparatory to a permanent close. Oliver Iron Mining Company's mines of this range have not curtailed since two months ago, and the situation there is less strained.

Considerable stripping is still under way on the Mesaba range. At Monroe, under development by the Minnesota Iron Company, they are finding some quicksand in their shafts. This material is quite common in the vicinity of this property. About 250 men are working at this time. At Morris stripping continues, as at many other mines. At Fayal there are three shovels in surface at the new 2,000,000-yard contract, and an extensive railway development is under way. At Stephens they are stripping, on company account, and will work as far into the winter as possible.

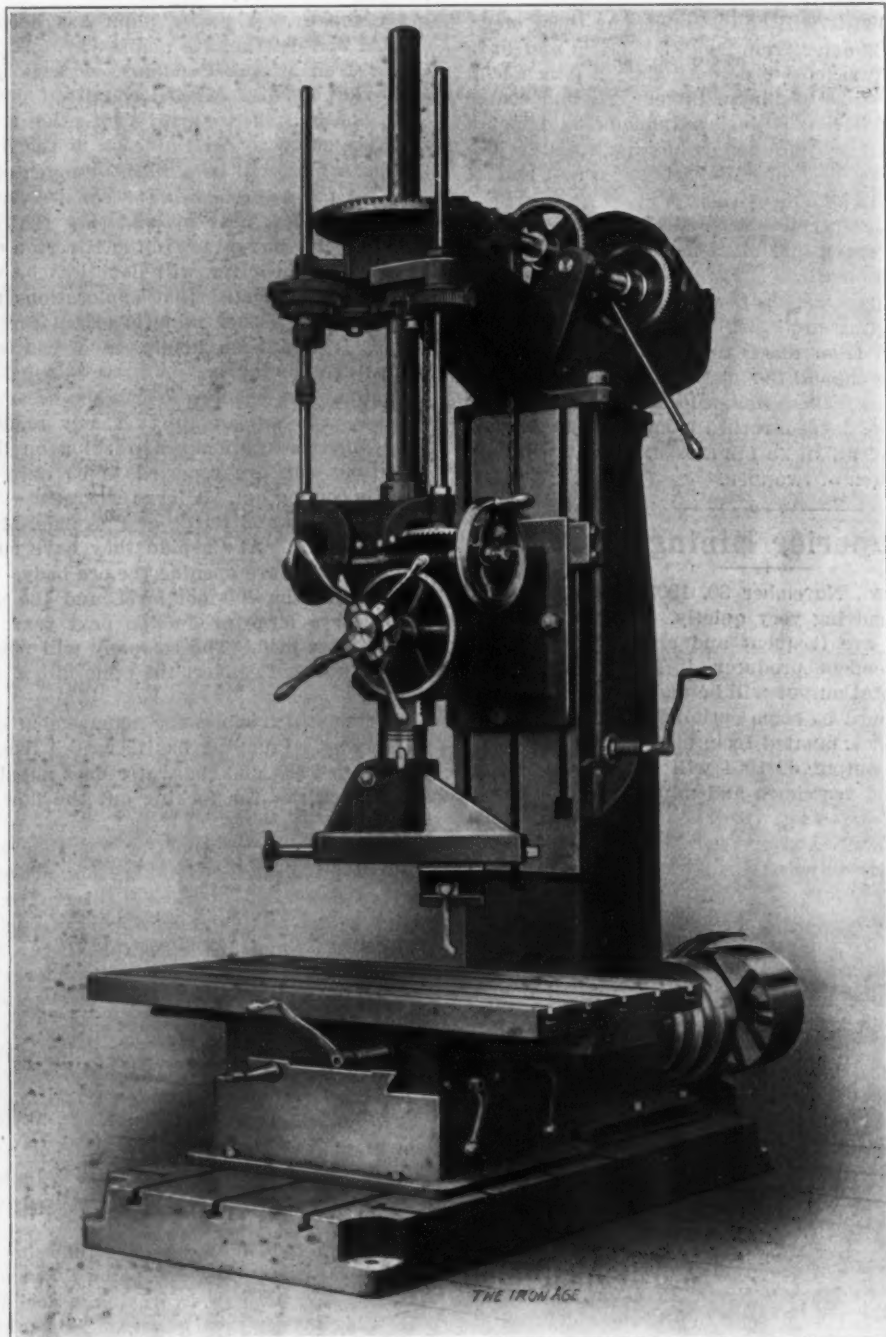
At Section 16 mine of Lake Superior Iron Company, Marquette range, they are going down another level to 900 feet. The mine is improving materially, and it looks like a big property once more. This mine seemed to be near its end a few years ago. New hoisting plants are now put in here, having 3-ton skips and cages. The latter save an 800-foot climb on ladders. D. E. W.

It is stated that the establishment of a *café* inside the gates of the Youngstown plant of the Carnegie Steel Company has had such a good effect that it is likely the officials may permit similar *cafés* to be established at other plants of the company. The Youngstown scheme was the venture of an employee who had lost an arm in the mill, and it has been well patronized by the men. The prices for lunches are reasonable, and the scheme has been appreciated by the workmen in a way very acceptable to the management of the mills. Only soft drinks are sold in connection with the lunches, and the profit to the proprietor comes from a large patronage induced by worthy service.

A Heavy Dreses Boring, Facing and Tapping Machine.

An improved machine has just been placed on the market by the Dreses Machine Tool Company, Cincinnati, Ohio, which is intended for heavy drilling, tapping, cutting holes in steel plates, bars or connecting rods, and boring and facing such pieces as cannot be conveniently put on a revolving table, machine or boring mill on account of their shape requiring a machine too

screw. The mode of driving the feed mechanism from the spindle is plainly shown on the accompanying illustration, and the change of gearing for the pipe threading attachment is made on the short stud close to the spindle shown on the right hand side. To disconnect the worm and thread cutting shaft a sliding bevel pinion on the back of the hand wheel is drawn out of mesh by a screw knob, shown in front of the hand wheel. The ordinary feed attachment is engaged by a friction in front of the large bevel gear on the left hand side, and the feed can



A HEAVY DRESES BORING, FACING AND TAPPING MACHINE.

large in swing. The driving gearing of this tool is very similar to that of a modern drill press, but proportionately larger and more powerful.

The spindle is provided with two geared feed arrangements, the one on the left hand being arranged for ordinary drilling and boring, while the one on the right-hand side is proportioned by means of change gears to the lead of the standard pipe threads. To avoid the irrational number of the diametrical pitch the rack on the spindle is cut of $\frac{1}{2}$ -inch circumferential pitch, so that each tooth in the rack pinion feeds exactly $\frac{1}{2}$ inch, and by this the exact lead coinciding with the pipe threads can be obtained by change gearing without using a lead

be varied by shifting the knurled knob on the feed rod while drilling.

The spindle is provided with a quick return operated by either of the four levers shown in front of the worm wheel. The socket of the spindle has a standard Morse No. 6 taper.

The facing and boring head shown has a capacity of 22 inches in diameter. It is clamped on the outside of the socket by means of the hexagon head screw and driven besides by the flat key put in the drift hole of the spindle. On the opposite side is a taper spring plug which engages in a corresponding taper hole in the socket, so as to hold the head in the proper place without

clamping it when it is slipped on. A larger facing and boring head of 36 inches diameter capacity is also furnished, which has two tool blocks, one on either end. The spindle and sliding head are balanced by a proportional weight in the column, but as the working attachment on the spindle varies so much in weight an extra elevating screw is provided. The table has a compound motion of 40 inches longitudinally and a traverse of 8 inches, which dimensions, however, can be changed to suit the nature of the work.

In case no collapsing taps or dies are used the machine is furnished with double friction pulleys on the lower cone shaft or a double friction countershaft. The driving bevel gear is made if a steel casting and is 19 inches in diameter. The least diameter of the spindle is $3\frac{1}{4}$ inches. The complete machine weighs about 9000 pounds.

The Worthington Disk Water Meter.

The duplex piston water meter, manufactured for many years past by Henry R. Worthington, Brooklyn, N. Y., is a device which is familiar to all who have to deal with apparatus of this nature. This type of meter, while essentially satisfactory and reliable, is yet necessarily heavy, somewhat bulky, and rather expensive.



THE WORTHINGTON DISK METER.

Numerous principles of measurement have been applied to the problem of producing at small expense a satisfactorily accurate meter for installation in any or all water works service connections and other places where an expensive meter is impracticable, and where extreme accuracy is not essential. The metering of water drawn from public supply systems is growing rapidly as a fair means of stopping the waste incident to perhaps every unmetered service, and this work absolutely requires the use of a nonexpensive measuring device.

Among the most successful of the types of meters which can be constructed at reasonable cost is the disk pattern, now produced in various forms by a number of makers. We present at this time an illustration showing an interior view of a new disk meter being manufactured by the Worthington Company. In this meter a light disk formed of hard rubber is placed in a compartment which may be approximately described as a hemisphere with a spherical segment taken out of the top. A slit cut in the disk upon one side fits over a vertical radial septum in the disk chamber. The disk itself, as actually constructed, is conical in shape on both the inner and outer surfaces. From the center of the disk a vertical spindle projects through a circular opening in the disk chamber, and its upper end rests against a conical central guide block. The spindle is thus constrained to follow a circular path.

It will be seen, by considering the possible motion of the disk, that there is never a free opening between the water inlet passage and the outlet, but that the disk is always interposed. However, as the result of even a slight difference of pressure between the inlet and the outlet sides of the disk, the latter will be caused to tip, resulting in an increase in the volume of the portion of the

disk casing opening to the supply and a decrease in that opening to the delivery. The continuation of this motion causes the disk to "wobble," while its spindle turns the crank arm attached to the central vertical spindle below the conical guide. The motion of the vertical spindle is reduced by an intermediate train of four gears, which operates a slow moving spindle extending upward through a stuffing box in the top of the meter casing. This spindle in turn operates the gears actuating the counter. This counter may be either of the pointer and dial type or of the straight reading type, and may be arranged to indicate in cubic feet, gallons, liters, &c., as required.

The Worthington meter is compact, and is constructed throughout of bronze composition, except the bottom plate, which may be of bronze or iron, as preferred. An interior strainer is a part of the regular construction, and connections are furnished as desired. There is no unbalanced water pressure upon the moving disk, except that operating to move it; its wear is therefore reduced to a minimum and easy movement, and great accuracy are said to be secured. The disk is cut from a solid piece of hard rubber. Extensive preparations have been made to manufacture the disk style of meter, a new shop equipped with special machinery having been built for its production alone. It is stated that all parts are made strictly interchangeable, and that all the meters are tested for accuracy at 150 pounds water pressure before leaving the factory.

The McShane Bell Foundry Fails.

At Baltimore, Md., on November 27, Clarence W. Dickerson was appointed receiver for the Henry McShane Mfg. Company, the largest manufacturers of chime bells in the country, and extensively engaged in the manufacture of brass and other metal compounds. Mr. Dickerson is president of the company. This action was not satisfactory to some of the creditors, however, and at Newark, N. J., on November 30, Vice-Chancellor Emery appointed Chauncey G. Parker receiver. The Merchants' National Bank, in its bill for the receivership, sets forth that it holds an overdue promissory note for \$2030. There are other claims that the company are said to be unable to meet. The action was taken after a conference of the creditors at the Merchants' Bank.

The company's books show assets of \$536,625, liabilities \$233,508, leaving a surplus of \$303,116. The merchandise stock of the company is in marketable condition, and the assets and bills receivable are regarded as substantially good and collectible. The embarrassment of the company was, it is said, brought about by the stringency in the money market and inability to realize on quick assets. Officials of the company say the trouble is only temporary.

Henry McShane founded the great bell works 50 years ago. Some of the finest chimes in New York, Philadelphia, Boston, Chicago, St. Louis and other cities were turned out at these works, which had a national reputation for the quality and tone of their bells. The largest bell in the country, now in Chicago, and many of the bells on United States war ships and at lighthouse stations were cast here.

The present Henry McShane Mfg. Company were organized some time ago and incorporated under the laws of New Jersey. The directors are Clarence W. Dickerson, John Gill, Jr., William D. Jameson, Nelson Perin, William Whitridge, J. G. McShane, John J. Nelligan and N. Winslow Williams. Mr. Dickerson, the president, was formerly president of the Sterling Bicycle Works. William D. Jameson is vice-president of the company and Francis W. Pike treasurer. The heirs of the late Henry McShane own a majority of the stock.

The business of the company has amounted to more than \$1,000,000 a year. The company are capitalized at \$500,000, and have neither bonds nor mortgages. The plant occupies nearly a block and about 800 men are employed. The works will likely be continued in operation.

The Thwaite Blast Furnace Gas Cleaning Plant.

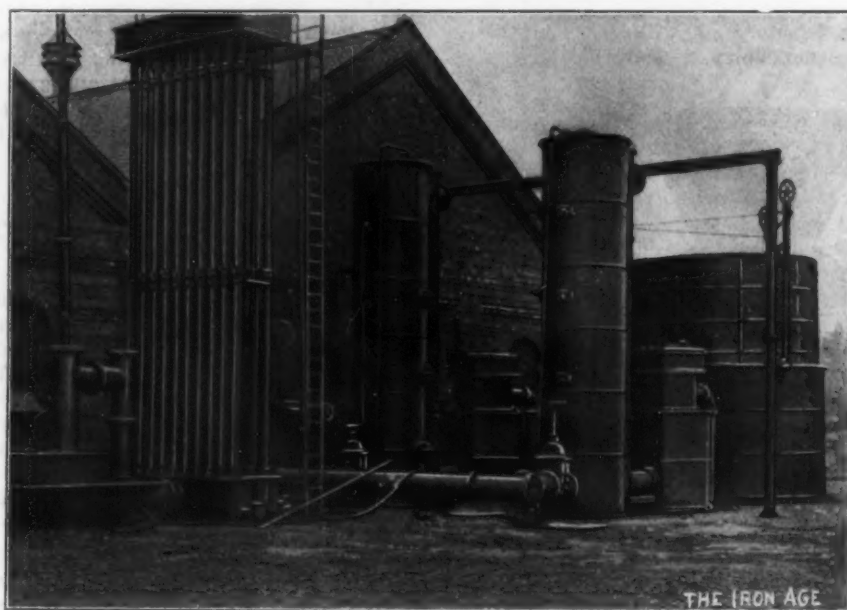
B. H. Thwaite of Westminster, England, the pioneer in the utilization of blast furnace gas for power purposes, who is now in this country, has favored us with the following data relative to his latest type of installation. The accompanying engravings show the general arrangement and the different apparatus of the series:

The gas is led to a special form of washer of the simplest construction, as indicated in the general plan. It is equipped with a water seal, which not only enables the deposited dirt to be removed at any time, but also acts as a ready outlet of escape in the case of sudden rushes of gas. This apparatus reduces the temperature of the gases, and a considerable proportion of the water suspended in them is condensed. It is so arranged as to compel the gases to flow uniformly and repeatedly through the water, this being effected by the action of the centrifugal fan, the position of which is indicated in the general plan within the engine house. The fan, to which reference will be made later on, is sufficiently

of coke scrubbers and sawdust scrubbers, stop this dust, so that the gas when it enters the holder is pure and almost dry. The last element in the series is the governor holder, which establishes a constant pressure, regulating the supply of gas to the engine. There are two automatic contrivances connected with the same. One of them is a large clock face with one hand, which at once shows whether the furnace gas supply is cut off and for how long. The other apparatus regulates the flow of the gas, so that the excess flow returns to the inlet of the centrifugal fan, and as the latter is several times more powerful than the requirements of the engine call for the gas is passed through the apparatus several times in rapid succession. A general view of the plant as erected at an English works is shown in the accompanying reproduction from a photograph.

The Thwaite plant, applied to blast furnaces working with all kinds of fuel and ore, has proved a reliable system, involving the minimum supply of cooling water and absorbing the maximum proportion of water in the gases.

So far as the cost of labor is concerned, one of the



THE THWAITE FURNACE GAS CLEANING PLANT.

powerful to establish and maintain a 10-inch suction. From the washer the gas flows into an atmospheric tubular cooler, shown in the elevation, which may act as a recuperator of hot air if that should be required for any purpose. Usually, however, the tubes are exposed merely to the cooling influence of the atmosphere. They are open on the top and at the bottom, so that they can be readily cleaned by either mechanical means or, what is generally sufficient, by flushing them with water from an upper tank. This tank combines the two sets of tubes through which the gas flows first in an upward and then in a downward direction. The curious fact has developed that the gas on leaving this atmospheric cooler has been found to have a slightly lower temperature even than the atmosphere. From this apparatus the gas enters the centrifugal fan, which, as already stated, is capable of setting up a 10-inch vacuum or of overcoming a corresponding resistance. It is so arranged that any dirt which accumulates can be washed out readily. The fan not only draws the gas from the two elements of the plant already described, but it also forces the gas through two additional filtration elements for the sake of future purification. These act also as safety valves; that is to say, if, due to a fall of the burden or to explosions in the furnace—not uncommon occurrences—there is an abnormal quantity of dust in the gas. If it were not for the filtration elements this dust would to some extent gain access to the engine and create serious trouble. The filtration elements, which consist of a duplicate set

of objections has been that it requires so little attention as to invite neglect. Simple gauges are, however, provided in the engine house, which at once indicate when and where the plant requires attention.

The Thwaite cleaning system is being applied to a number of plants in Europe without any reference to the different makes of engines. The iron makers select the purifying plants independently of the type of engine.

Mr. Thwaite has designed a static apparatus for the rough cleaning of gases intended for hot blast stoves and is developing an electro-static system which is of great promise, since it would avoid the loss of the sensible heat of the gases.

Complete statistics from 85 per cent. of the automobile manufacturers in the United States to September 3 indicate that the actual sales for the year 1903 will be 11,000 cars, valued at \$12,000,000. This is double the business of 1902, to which must be added the foreign importation of 200 cars, valued at \$800,000. The importation of foreign cars is about the same as last year. Trade in foreign made cars is probably at its maximum and will slowly decline, as the American manufacturers are rapidly supplying the demand.

J. O. Emanuel Trotz has resigned as metallurgist of the United States Steel Corporation. Mr. Trotz is now in England, but will soon return to his home in Worcester, Mass.

Central Electric Light and Power Stations.

The Department of Commerce and Labor has issued a Census Bulletin, No. 5, on Central Electric Light and Power Stations, the result of the first complete census on the subject. It was prepared under the direction of T. Commerford Martin of New York, the editor of the *Electrical World and Engineer*:

Central electric stations supply current for commercial and private uses, such as heating and lighting pri-

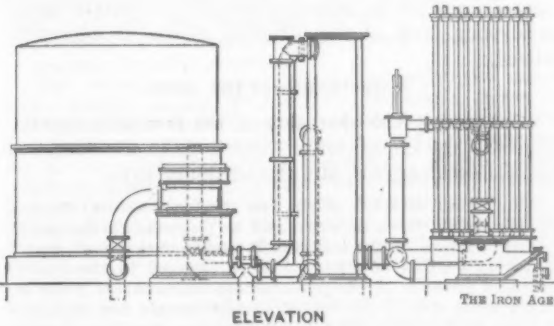


Fig. 1.—Elevation.

vate dwellings, business houses, hotels and office buildings, and furnishing power for street railways, elevators, manufacturing purposes and charging batteries. Electric current is also supplied for public service, in lighting streets, parks and municipal buildings and for various purposes connected with their maintenance.

In addition to central electric stations there are two other sources of supply—light and power stations operated by electric railway companies, and isolated electric plants operated to furnish light or power for the business of the owner. The statistics for the former are

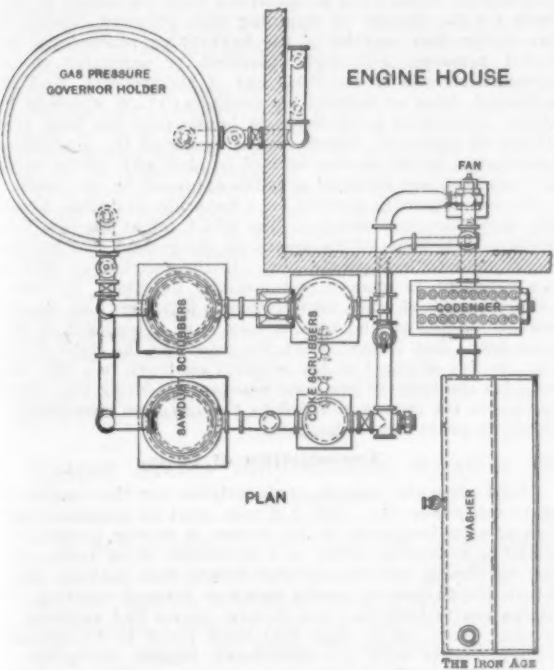


Fig. 2.—General Plan.

THE THWAITE FURNACE GAS CLEANING PLANT.

presented in Census Bulletin No. 3, Street and Electric Railways, but concerning the latter no detailed information has been secured, and, for reasons elsewhere mentioned only incidental reference to isolated plants is made in this report, although a few such establishments may sell a portion of their product.

The totals for the stations operated under private and municipal ownership, respectively, are summarized in the following table:

Table I.—Central Electric Stations, 1902.

Items.	Total.	Private stations.	Municipal stations.
Number of stations.....	3,620	2,805	815
Cost of construction and equipment	\$504,740,352	\$482,719,879	\$22,020,473
Earnings from operation.....	\$84,186,605	\$77,349,749	*\$6,836,856
Income from all other sources	\$1,514,000	\$1,385,751	\$128,249
Gross income.....	\$85,700,605	\$78,735,500	\$6,965,105
Total expenses.....	\$68,081,375	\$62,835,388	\$5,245,987
Salaried officials and clerks:			
Average number.....	6,996	6,046	950
Salaries	\$5,663,580	\$5,206,199	\$457,381
Wage earners:			
Average number....	23,330	20,863	2,467
Wages	\$14,983,112	\$13,560,771	\$1,422,341
Power plant equipment:			
Steam engines—			
Number	5,930	4,870	1,060
Horse-power	1,379,941	1,232,923	147,018
Water wheels—			
Number	1,390	1,308	82
Horse-power	438,472	427,254	11,218
Generating plant equipment:			
Dynamoes—			
Direct current, constant voltage—			
Number	3,823	3,405	418
Horse-power	442,446	418,913	23,533
Direct current, constant amperage—			
Number	3,539	2,957	582
Horse-power	195,531	157,768	37,763
Alternating and poly-phase current—			
Number	5,122	4,300	822
Horse-power	987,008	806,315	90,688
Output of stations:			
Kilowatt hours—total for year.....	2,453,502,652	2,257,598,213	195,904,439
Total number of arc lamps	385,698	334,903	50,795
Total number of incandescent lamps.....	18,194,044	16,616,598	1,577,451

* Includes estimated income from public service.

During the year 1902 there were 252 electric railway companies that reported the generation of electric current for sale for light and power. Such plants are virtually central stations, and should be considered in connection with the statistics given in Table I. Of the railway companies referred to, 118 reported that the generation of electric current for this purpose was of sufficient importance to enable them to give the number of lamps in use and the amount of income from the sale of current. Adding these stations to the central stations enumerated in this report, the number would be increased to 3738, the total income for the sale of current to \$90,458,420, the number of arc lamps to 419,561, and of incandescent lamps to 19,636,729.

Central electric stations have become active competitors for purposes of illumination with plants for the manufacture of gas, but this competition has been neutralized to some extent by the control which, in many instances, gas companies have secured over competing electric stations. The following figures for the two industries show the comparison:

Comparative Summary of Central Electric Stations and Gas Plants.

Items.	Central electric stations, 1902.	Gas plants, 1900.
Number of establishments.....	3,620	877
Cost of construction and equipment.....	\$504,740,352	*\$567,000,506
Cost of supplies, materials and fuel.....	\$22,915,932	\$20,605,356
Salaried officials and clerks:		
Average number.....	6,996	5,904
Salaries	\$5,663,580	\$5,273,500
Wage earners:		
Average number.....	23,330	22,459
Wages	\$14,983,112	\$12,436,296
Income	\$85,700,605	†\$75,716,693

* Capital. † Value of products.

While the statistics for the two industries do not cover the same year, the periods reported correspond sufficiently for a general comparison. The amounts shown for central electric stations exceed those for the manufacture of gas for all the items except the "cost of construction and equipment," which is compared with the capital reported for the manufacture of gas. The capital stock and funded debt reported for the 2049 central

electric stations owned by corporations amounted to \$627,515,875, and would possibly be a better comparison with the capital reported for gas companies. There were 827 cities and towns in which one or more gas plants were in operation at the twelfth census, and in 1902 there was a central electric station in operation in all except 153 of these places.

The National Bankruptcy Law.

Report Upon Its Operation During Year Ending September 30.

WASHINGTON, D. C., December 1, 1903.—The annual report upon the operation of the Federal Bankruptcy law has been submitted to the Attorney-General by E. C. Brandenburg, in charge of bankruptcy matters in the Department of Justice, and is of unusual interest, owing to the fact that the returns for the year reflect the improved conditions largely due to the amendment of the law in several important particulars by the last Congress.

Voluntary Cases.

The grand total of voluntary petitions in bankruptcy filed throughout the United States for the year ending September 30, 1903, was 14,308, this number being made up of 7936 cases filed during the six months ending March 31, 1903, and 6372 filed during the last six months, which shows a material decrease in the number of petitions filed from that of the year ending September 30, 1902, and, in fact, is considerably less than for any previous year since the enactment of this law.

The reports furnished by the clerks of the courts also show that there were 762 petitions dismissed, while the petitioners in the remaining cases were adjudicated bankrupt.

The total net assets realized in 11,663 cases closed during the past year were \$8,051,471, while the liabilities involved therein were \$106,147,378. The summary also discloses the fact that of the cases closed there were 6839 cases, with assets of various amounts, in 466 of which they were less than \$500, while in 4824 cases there were no assets. The large number of cases in which there were no assets is an indication that advantage of the voluntary feature of the law, as a rule, is only taken in cases where the debtor has become almost hopelessly insolvent. The reports also show that of those persons who became voluntary bankrupts, 961 were farmers, 4582 were wage earners, 3305 merchants, 368 manufacturers, 473 professional men, and 1974 contractors, hotel keepers, real estate men and others.

Involuntary Cases.

Under the provisions of the law authorizing a creditor to file a petition for the purpose of having a debtor adjudged bankrupt, 2567 petitions were filed during the year ending September 30, 1903. Of these 1262 were filed during the six months ending March 31, 1903, and 1305 during the last six months. The number filed is a substantial increase over any preceding year during the existence of the law, showing that the provisions of the law are being better understood. Of those filed during the past year 375 were dismissed, either because no act of bankruptcy had been committed, or for want of jurisdiction or otherwise, while the balance appear to have been adjudicated. As to the occupation of the parties against whom involuntary petitions in bankruptcy were filed, so far as reports were made, it appears that 669 were engaged in mercantile pursuits, 91 were manufacturers, 17 professional men and 203 were engaged in various other occupations. In 1071 involuntary proceedings which were closed during the year it appears that the assets realized amounted to \$4,520,680, while the liabilities were \$21,467,566. Of these proceedings, in 169 there were no assets, while in the 902, with assets, there were 180 with less than \$500.

The act amending the bankruptcy law increased to a slight extent the fees of both the referees and trustees, but owing to the varying methods of keeping accounts and the varying charges that may be taxed in the different districts for certain classes of service, it has not been possible to obtain, with any degree of accuracy, an aver-

age of the expenses incident to the conduct of a proceeding in bankruptcy. This is further due to the fact that in cases of magnitude expenses may be incurred by reason of litigation arising in connection with the collection of the assets, while in another case the expense of conducting it would be limited to the filing of fees and the cost of serving notices and advertisement. It is believed, however, that the courts have generally followed the policy outlined by Congress in the limitation of the fees to be charged by seeing that they are reduced to a minimum. That the charges incident to the conduct of a proceeding in bankruptcy are less than those ordinarily incurred in connection with the administration of an estate under the insolvency laws of the different States is generally admitted.

Operation of the Law.

Concerning the operation of the law with special reference to the important modifications in the statute made by the last Congress, Mr. Brandenburg says:

The administration of the law disclosed several features requiring legislative treatment, and in response to the demand of a large portion of the business interests throughout the United States as well as of many of those engaged in the administration and practice of the law, certain amendments were enacted which have already proven of unquestionable benefit and which will, no doubt, do much toward removing the little criticism of the statute which has been heard in certain quarters. A modification that has already proven of much importance is that which defines as an act of bankruptcy the appointment of a receiver or trustee to take charge of one's property while insolvent, thus removing whatever doubt existed upon this point, the courts on a number of occasions having formerly held that such action was not comprehended by the terms of the law, nor tantamount to a general assignment, or transfer of property with intent to prefer or hinder creditors.

Under the law, as it was originally enacted, it was almost impossible to defeat an application for a discharge, no matter how flagrant the acts of the bankrupt may have been. Unless he had committed an offense punishable by imprisonment, as provided in the law, or had concealed or failed to keep books of account, with intent to conceal his financial condition, it was impossible to prevent his discharge. The amendatory act adds four grounds of objection, thus materially strengthening this feature of the law. Accordingly, in addition to the foregoing instances, a discharge will be refused, first, if a man obtains property on credit upon a materially false statement in writing made for the purpose of obtaining such property; second, if he has within four months of the bankruptcy proceedings, transferred, removed, destroyed, concealed, or permitted to be removed, destroyed or concealed any of his property, with intent to hinder, delay or defraud his creditors; third, where in a voluntary proceeding a discharge in bankruptcy has been granted within six years; or, fourth, in the course of the proceedings in bankruptcy, where he has refused to obey any lawful order of, or to answer any material question approved by the court.

It was originally possible for a bankrupt to decline to answer any questions propounded to him which might disclose the disposition or location of his assets, on the ground that his answer might tend to incriminate him. If the court shall now order the bankrupt to answer any material questions, he may still avail himself of this constitutional privilege and decline to answer, on the ground that it may have a tendency to incriminate him. But, in that event, the court has the right to assume that he has disposed of his property contrary to a fair dealing with his creditors, or has done some act rendering him unworthy to receive the bounty afforded by the law, and accordingly may refuse to grant him a discharge.

Jurisdiction of Suits.

Soon after the passage of the original act the question arose as to the power of a United States court to entertain jurisdiction of suits instituted by the trustee to recover property transferred to a creditor either as a preference or as void under the law as having been transferred within four months, with the intent and purpose to hinder, delay or defraud creditors. Many of the courts held that the Federal courts had exclusive jurisdiction, while others held that suits could be brought in the Federal courts with the defendant's consent, or in the State courts alone, and still others, that the jurisdiction in the two courts was concurrent. By the amendment, however, suits of this character may be brought in the Federal courts as well as the State courts, without obtaining the defendant's consent, thus materially strengthening the law.

The main subject of discussion, however, was with reference to that feature of the law which required that all creditors who had received payments on account within four months of the institution of bankruptcy proceedings must surrender the same before they could prove a claim for the balance of the account, and thus share in the dividends. The amendment changes the law so as to meet what was believed to be the intention of the framers of the original provision, which was to enable such payments on account to be retained, and to allow proof to be made of the balance of the account, accompanied by the corresponding right to share in the dividends, unless the payments on account were received with a knowledge that a preference was intended, or that the purpose of the transfer to the creditor was with

the intent on the bankrupt's part to hinder, delay or defraud his creditors.

Under sections 34 and 37 of the law, courts of bankruptcy are authorized to appoint such number of referees as may be necessary to assist in expeditiously transacting the bankruptcy business. It has, however, been the source of some complaint in several jurisdictions that the number has been limited to such an extent as to render it difficult, if not almost impossible, for the referees appointed to properly dispose of the business. In several of the largest cities the number of referees has been restricted to two or three, with the result that delays occur, and much of the business of a judicial nature, which should be conducted in the presence of the referees themselves, is of necessity delegated to some clerk or employee of the referee, or is conducted without the presence of any representative of the court whatever. The evident purpose of Congress in leaving without restriction the number of referees to be appointed would seem to indicate that these evils are left to be remedied by the appointment by the courts of the necessary number of referees to transact the public business.

The amendments having largely removed the objections which existed against the law, there is still a danger which confronts its practical operation and which is liable to subject it to criticism. This, however, is not due to inherent defects, but to the action of creditors themselves. In many instances proofs of claims are sent by creditors direct to the referee, who sits in a judicial capacity and is the representative of the court. The proof of a claim thus filed makes a *prima facie* case, and as a rule is allowed, unless objection thereto is filed. The claim thus filed may be largely inflated, or entirely fictitious, or one to which a good defense might be made, but upon its face is *bona fide*, and accordingly allowable. It frequently happens that through collusion, or otherwise, large claims thus filed are in behalf of relatives or friends, but upon their face are meritorious.

Creditors Should Attend Meetings.

Accordingly it might happen, and no doubt has frequently happened, that by reason of the fact that nearly all claims have been sent direct, the only persons present at the creditors' meeting are the bankrupt and his counsel, and possibly some creditor interested in the bankrupt. In such cases it is possible to elect a trustee entirely in sympathy with the bankrupt and who is not likely to take an aggressive step in an effort to defeat such claims as are apparently good from the proof which is submitted to the referee, or investigate the past transactions of the bankrupt with a view to recovering property which should become a part of the assets, or, indeed, take any step that will militate against the bankrupt's interest.

Creditors are frequently deterred from filing proof of claims for the reason that no assets are scheduled, thus offering an inducement to the commission of fraud. It has frequently happened that although no assets have been scheduled by a debtor, a creditor, by availing himself of the privilege afforded by the law for an examination, not alone of the bankrupt and his relatives, but of any one having knowledge of his affairs, has secured material benefits. This right of examination is in the interest of honesty and fair dealing between a debtor and his creditors, and was given to the creditor in order that advantage might be taken of the provision. It may be safely said, therefore, that this right of examination, so valuable to the creditor, should be taken advantage of on every opportunity, in order that it may be distinctly understood by every person violating the law that the conduct of his business, which has occasioned his insolvency, must be laid open to the public, so that the largest amount of assets possible at a minimum expense shall be produced for distribution to creditors.

Several legal associations and others, during the past year, have given expression to their approval of the bankruptcy law, and it is confidently expected that its future operation will tend greatly to increase the opportunities for a better business understanding between debtor and creditor, and that in the event of a financial depression it will do much toward preventing a panic, which might otherwise occur.

W. L. C.

United States Shipbuilding Receiver Made Permanent.

At Philadelphia, on November 28, Judge Acheson, in an opinion handed down in the United States Circuit Court of Appeals, refused the appeal of the United States Shipbuilding Company for the removal of the receiver who was named by Judge Kirkpatrick in the Circuit Court. The appeal was taken by the company from the Circuit Court's decision in appointing James Smith, Jr., receiver at the demand of Rowland R. Conklin, Max Nathan, Jacob W. Mack and James B. Maguire, stockholders of the company, who charged the officers with malfeasance in office. Judge Acheson decided several novel points of law. The grounds on which the appeal was argued were, first, that the national bankruptcy law superseded all State laws; second, that the Federal courts could not proceed under a State statute; and third, that the proceedings should have been thrown out of court because no evidence touching the allegations of insolvency and fraud was adduced, but the matter was presented

solely through oral arguments and the briefs subsequently submitted by counsel. These contentions have been overthrown.

After enumerating the provisions of the corporation act of the State of New Jersey which have a bearing on this particular case, the judge said:

Insolvency of a corporation, coupled with gross mismanagement of its affairs by its Board of Directors, and such misconduct of the directors as is here charged, justify the appointment of a receiver by a court in equity, independent of any statutory authority.

It was argued at the argument that the order appealed from is equivalent to a final decree. Although there is no assignment of error to bring this question before us, still it deserves present consideration. As we read the order it was intended to be a finality, and is not so in legal effect.

But to remove any possible doubt on this point, we will amend the order by striking from the fifth paragraph the concluding words, "and especially by the act of Legislature of the State of New Jersey, entitled an act concerning corporations, revision of 1896," and substitute therefor the words, "the receiver to be subject at all times to the orders and directions of this court," and we will add to the end of the order the following provision: "The foregoing order to stand until the further order of the court," and thus amended the verdict of June 30 is affirmed.

This decision is of great importance, as it is stated that at every turn the receiver has been confronted with difficulties in his endeavors to obtain control of the subsidiary plants. Under the terms of the sale of the various plants to the parent United States Shipbuilding Company the several subsidiary concerns leased back to themselves their plants and controlled all their assets. In appointing a temporary receiver Judge Kirkpatrick remarked that the parent company appeared to be "merely a shell."

An examination of the lease of the Union Iron Works at San Francisco, for example, reveals the fact that no rent or other money consideration was paid to the parent company. As far as the lease shows it was a gift from the United States Shipbuilding Company to the Union Iron Works, by means of which the latter could borrow money on the assets the parent company was supposed to own.

In the statement to the listing committee of the New York Stock Exchange the United States Shipbuilding Company represented itself to be the owner of all these assets.

The result is that in half a dozen States the receiver has found his hands tied. Local banks and other lenders have come in and placed liens on the properties of these subsidiary companies, and the receiver cannot get money with which to operate them. He went to the Sheldon Reorganization Committee, with which about \$14,000,000 of the total issue of \$14,500,000 of the first mortgage bonds were deposited, and asked if the members would agree to the issue of receiver's certificates. This proposition was rejected, and foreclosure suits were brought in the Federal courts of each State where the subsidiary plants lay. These suits were brought against the parent company by the Mercantile Trust Company, of New York, as trustee for the mortgage for \$10,000,000, popularly known as the Schwab mortgage, made out to the New York Security & Trust Company.

The institution of a suit to put the Bethlehem steel plant in the hands of a receiver will, it is said, now be pushed. The next hearing in the pending action is set down for December 8, the same date that the argument is to be heard on the rule to show cause why another receiver should not be appointed at the behest of the Mercantile Trust Company.

It is believed that between now and that day a compromise will be effected and same plan of reorganization satisfactory to all the first mortgage bondholders will be devised. Then the only shadow overhanging those interested will be the threatened inquiry of the Governors of the New York Stock Exchange into the truth or falsity of the statement made to its listing committee by the officers of the United States Shipbuilding Company.

Meanwhile the various shipyards, acting so far as possible as independent plants, have been doing more or less business.

Notice was posted at the Sharon works of the American Steel Foundries on November 26 of a reduction in

wages to take effect on December 1. The cut will be 10 per cent., which will bring the molders' wages down to \$3.15 a day. It is said that the reduction is to take effect in all the plants of the American Steel Foundries.

Steam Pipes and Their Connections.*

Notes on Arrangement and Construction.

BY ROBERT C. MONTEAGLE.

The principal objects of this paper are, first, to point out and emphasize some of the causes of failure of steam pipes, and, second, to describe some points in the general design, as well as material entering into the construction of steam pipes, which go far to insure their integrity under the most severe conditions of service. The subject is one which is becoming more important every year, owing to the rapidly increasing steam pressures which are coming into such general use. The causes of failure in steam pipes may be classified as follows: First, faulty design. Second, bad workmanship. Third, defective material.

Faulty Design.

The first of these—faulty design in some one of its many and varied forms—is in evidence in a remarkably large percentage of vessels. One of these forms of faulty design is in the employment of copper for pressures exceeding, say, 150 pounds per square inch. Owing to the number of accidents occurring with copper steam pipes, this material is being used less frequently in each succeeding year. The elastic limit of good sheet copper is reached at from 5300 to 5600 pounds per square inch, and

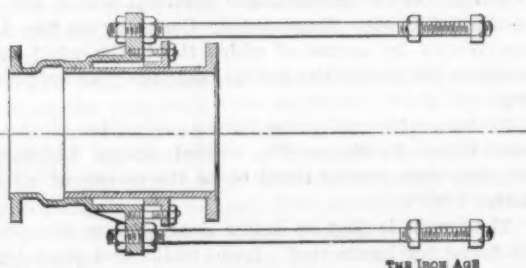


Fig. 1.

the ultimate tensile strength at about 30,000 pounds per square inch. In good steel pipe the elastic limit reaches 30,000 to 35,000 pounds per square inch, and the tensile strength 53,000 to 60,000 pounds per square inch. These figures alone demonstrate the hopeless inferiority of copper for use in steam pipes as against steel. It may be accepted as a fact, also, that copper in the vicinity of brazing is more or less injured by the heating, and in some cases by the overheating, to which it is subjected, yet where copper steam pipes, say 6 inches in diameter and over, are used, the best practice is to "make them up." My reasons for so stating are that solid drawn copper piping of such diameter and of the necessary thickness required is almost invariably of a nonuniform thickness and frequently possesses the undesirable characteristic of a tendency to split longitudinally.

This characteristic, it may be noted, seldom develops at the original time of testing, and hence its extreme danger. On the other hand, brazed copper piping never can possess the same strength as the original sheet from which it was made, even granting that the workmanship is exceptionally good. Rules are given for determining the thickness of copper to be used in steam pipes, in the pamphlet issued by the Board of Supervising Inspectors of Steam Vessels, but which do not state that such thickness should be increased where bends occur. Almost any engineer is familiar with this requirement, but unfortunately there are individuals who deem it good practice to elude their duty when presented in this or other similar form. It is, therefore, important that this requirement be embodied in the said rules. A better rule would

subjected to pressures exceeding, say, 150 pounds per square inch, and which exceed, say, 3 inches in diameter.

Another form of faulty design is frequently found in the method of allowance for expansion. The two ordinary methods are illustrated by Figs. 1 and 4. The method at Fig. 1 has the drawback of being unbalanced, and therefore must be furnished with "preventer bolts" so that the sleeve may not be forced out of place by the unbalanced pressure. The adjustment of these bolts must be accurately made, or an undue strain will be brought on the piping, either when steam is turned on or when the piping is cold. The other method, at Fig. 4, is a simple dependence on the flexibility of the piping itself to take

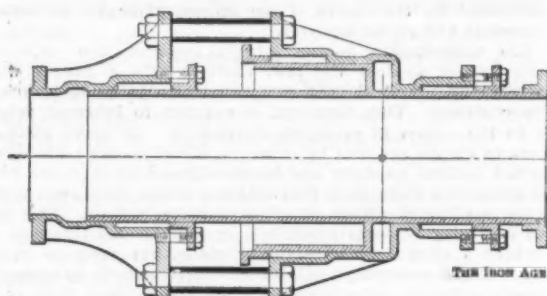


Fig. 2.

up the expansion. With piping, say, 3 inches in diameter and over this is not good practice, as the metal will become crystallized after constant working, and is liable to crack or break at the most rigid point. This class of accidents has in various cases been fatal.

Another form of faulty design, and a common one, is in the formation of depressions, however slight, in the piping; or, in other words, dropping from one plane to a lower and rising to the original plane again. When steam is turned on, the body of water which has collected in this depression is set in motion and carried to the engine, where damage is done or excessive strains set up. In any case separators of ample capacity should be placed near the engine, so that they may collect any water in the pipes. An efficient separator is very desirable, as the entrainment of water by steam traveling at high velocities is always a source of anxiety to engineers. It is absolutely certain that after entrainment of water takes place no possible arrangement of piping can be made to carry such

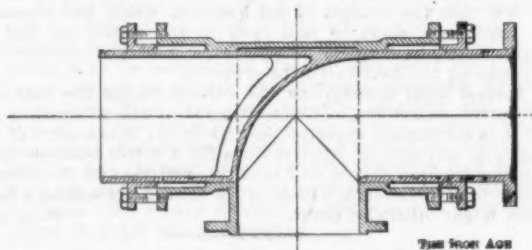


Fig. 3.

water back to the boiler without the intervention of an efficient separator. A method which will somewhat mitigate this evil is to superheat the steam as it leaves the boiler, and should the quantities of water carried over not be too great this will possibly obviate the trouble. Objections to superheated steam are, however, great enough to rule this method out with the majority of engineers.

Bad Workmanship.

The second division, as classified, of the causes of failure of steam pipes is bad workmanship. This may be subdivided again into bad workmanship at the mill and bad workmanship by the coppersmith or pipe fitter who puts the piping in place. Bad workmanship at the mill is beyond the control of the users of steam pipe, whether that pipe be made of copper or of steel, and the following remarks are equally applicable to the manufacture of

* A paper read before the Society of Naval Architects and Marine Engineers, New York, November 19, 1903.

both kinds of pipe. It is nothing short of criminal on the part of the manufacturer of piping to neglect taking all the precautions possible to inspect the material before, during and after the process of manufacture. Possibly this is done, but I regret to state that such is not my belief. On the contrary, my belief is that inspection at the mill is not rigid enough and that this is why we have some of our failures of steam pipes.

The builder of a steam vessel, who installs all machinery, makes all connections, &c., is held responsible for this machinery, piping, &c., until the vessel is delivered, and frequently for a much longer time. Should any part of the piping fail, possibly causing the loss of life, the builder is held responsible. Does this not seem unjust? Providing that the fault be in defective piping, the onus of blame should be placed on the manufacturer of the pipe, and he should be obliged to pay for the damage done. This method, if enforced, would undoubtedly have

satisfactory method of doing this, and that is to subject each section of pipe to, say, not less than five times the working pressure required. As a matter of fact this is never done unless under direct instructions of the consignee. As before remarked, a characteristic tendency to split longitudinally has been observed in solid drawn copper piping of large diameter, when subjected to high pressures, and this tendency seldom exhibits itself at the initial test. Nevertheless, the initial test will undoubtedly develop an existing weakness in however small a degree, even though that weakness be not manifest. A second or a third test at the place where the piping is installed may then fairly be expected to cause fracture in piping which is inherently weak. All steam pipe which is "made up" by the coppersmith should be tested in the same manner and as many times. The fact that a pipe fractures under a water test pressure should never be considered a misfortune, however much it may appear so.

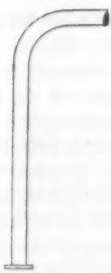


Fig. 4.



Fig. 5.

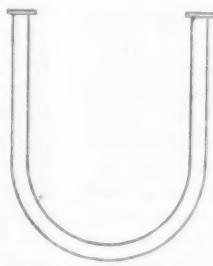


Fig. 6.

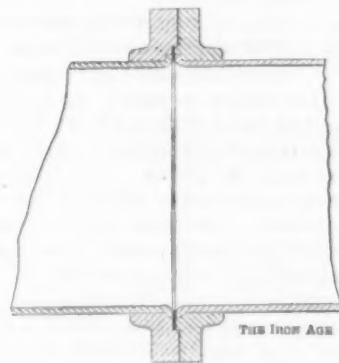


Fig. 7.

the desired effect of better inspection at the mill and the production of better piping. Regarding bad workmanship by the coppersmith, it has been my observation that the greatest number of cases of bad workmanship in copper piping are directly connected with the brazing of flanges to pipes. The copper is frequently injured by excessive heating. To what extent the tensile strength of the copper is lessened by such bad workmanship it is very difficult to ascertain, but when such cases are discovered, however slight the burn, it is imperative to condemn the work. The heavier copper piping is, the greater danger there is from "burning" during the process of brazing joints, and hence further danger in its use for high steam pressures. The fitting of steam pipes of all kinds is a very important matter. Through the careless work or bad judgment of pipe fitters, strains are brought on piping which are a constant source of danger. Expansion not allowed for, joints made up where flanges do not meet fairly, proper allowance not made for gaskets, the making up of joints before vessels are launched and no allowance having been made for possible change of form; these are a few instances of bad judgment or carelessness of pipe fitters, and they might be multiplied. The inspection of this piping during the time of putting in place is therefore important, and should receive the constant attention of individuals who first of all possess the knowledge of what is required and, secondly, whose duty it is to see personally that it is put in accordingly.

Defective Material.

The third division, as classified, of the causes of failure of steam pipes is defective material. We may consider all material defective which fails to satisfy safely the necessary conditions of its use. The failure to comply with these conditions may be due inherently to the quality of the material, or to the kind of material used. For the first of these we must hold the mill responsible, and for the second the designer. The material worked up into piping, whether of copper or steel, should be, and no doubt is, subjected to tests to prove its fitness for the purpose required. The question then arises: Are these tests sufficiently severe to develop the possible fact of weakness or positive fracture? Should it not be made an absolute certainty at the mill that all steam piping shall stand the pressure for which it is intended? There is only one

It is a warning to be heeded, and the interpretation of the warning is to insist upon having better material and better workmanship.

Provisions for Expansion.

I may now briefly enumerate some points in the general design, as well as the material entering into the construction of steam pipes, which will practically insure their integrity under the most severe conditions of service, if properly put together. In making a general arrangement of steam pipes two requirements of vital importance should be borne in mind—viz.: Ample allowance for expansion must be made and, if possible, there should be no "pockets" in the steam line. Permanent set will

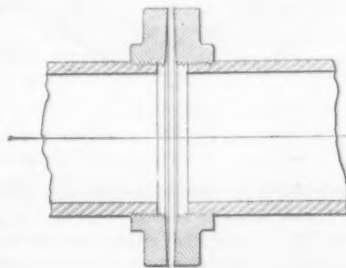


Fig. 8.

occur when metals are strained beyond the limits of their elasticity; hence the absolute necessity of proper attention to expansion. Should permanent set occur it is only a matter of a short time till fracture takes place, due to the brittleness thus engendered. Metals of all kinds, subject to great variations of temperature and to varying strains, are constantly changing their molecular structure. In copper piping, therefore, where the elastic limit is so low, this should be neutralized by annealing the pipe at well advised intervals. The weight of piping and connections should be carried by carefully arranged hangers suspended from deck beams, spaced at frequent intervals. These should allow perfect freedom of movement, and at the same time be constructed so that the vibration will be absorbed.

An expansion joint made in either of the forms shown at Fig. 2 or Fig. 3 is a very satisfactory method of allowance for expansion, provided that there be a good packing in the stuffing box. It will be noted that either form is perfectly balanced. There are several good packings in the market for this purpose, but one notably so. This is a flexible metallic packing very much in use. Stuffing boxes for this purpose should be exceptionally deep, as it is not necessary then to pack them so tightly, and as a consequence a freer movement is permitted to the sleeve. The expansion joint shown at Fig. 2 has an enlargement cast on the sleeve. This forms a piston at the end of the sleeve adjacent to the casting having the large stuffing box. The end of this piston next to the large stuffing box is open, and is guided by same. In the sleeve below the piston are drilled holes which permit the admission of live steam. The area of the piston on which the steam acts must be made equal to the area of the main steam pipe, and so while permitting perfectly free expansion, it is also perfectly balanced.

The expansion joint at Fig. 3 is more simple than that at Fig. 2, and may be used to great advantage where a right or more acute angle is required in the main steam pipe. The sleeve is simply extended through the main casting and has a stuffing box on each end. In the sleeve is cast a defective diaphragm turning the steam into the side branch. By giving a few figures it will be readily seen how important a function the balanced expansion joint performs, the importance of this function increasing rapidly as the diameter of the piping increases. Take for example a 15-inch steam pipe with 200 pounds working pressure of steam. The area of a 15-inch circle equals 176.78 square inches; then, $176.78 \times 200 = 35,356$ pounds, or 1578 long tons, unbalanced load on the steam pipe. With the ordinary type of expansion joint, shown at Fig. 1, this unbalanced load must necessarily be taken up by the preventer bolts, subjecting these bolts and the castings to which they are attached to this strain. Two other good methods of allowance for expansion are shown at

Fig. 7. This method has the very decided advantage of being readily fitted at the place of installment.

Discussion.

Opening the discussion, Mr. Forbes called attention to two interesting details which he reported as having served him well in avoiding some commonly met difficulties in steam piping work. First, to prevent the

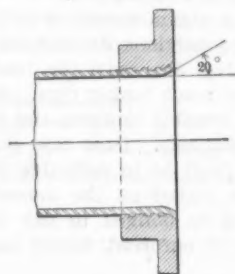


Fig. 11.

troubles due to blowing out of gaskets between pipe flanges of the usual pattern, he has frequently slightly dished the faces of the flanges, making them concave toward each other, as in Fig. 8. The dishing is exaggerated in the illustration, the very slightest concavity being sufficient to form such a tapering gasket space as to offer effective resistance to the tendency of steam pressure to drive the gasket outward. The initial making up of the joint compresses the outer edges of the gasket slightly more than the inner circumference, making of the gasket a circular wedge which is not easily blown out. The second of Mr. Forbes' devices is one for which he claimed independent although not original invention, as since contriving the article he has learned that a somewhat different design for accomplishing the same purpose was brought out some

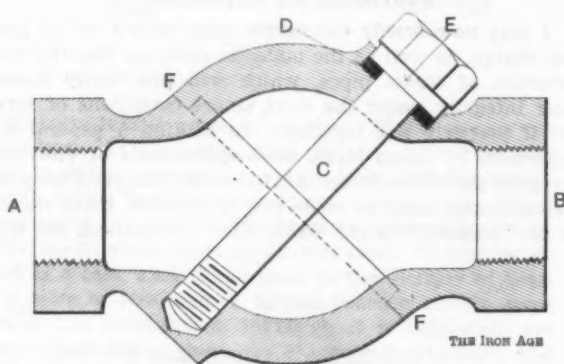


Fig. 9.

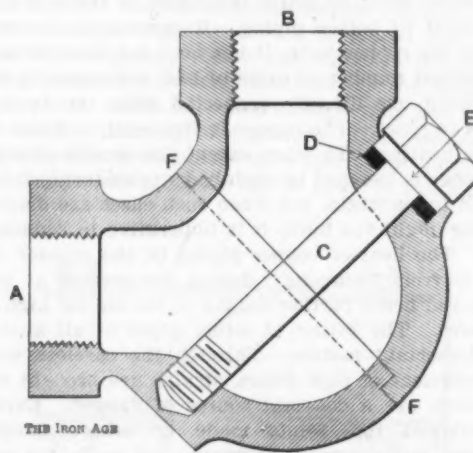


Fig. 10.

Figs. 5 and 6, which show simply an S-bend and a U-bend, respectively. These should be used only in moderately sized piping, as the larger the diameter of the pipe the more rigid it becomes, this rigidity being enhanced by the necessarily increased thickness of the material. An apparent drawback to this form is that it occupies much more space than an expansion joint, and the claim cannot be made that it is any lighter.

The Ideal Steam Piping.

With the perfection to which the manufacture of steel pipe has been brought, the ideal steam pipe for high pressures has been realized. Add to this steel flanges welded to the pipe, each pair of flanges being made male and female, and having a wire insertion gasket between them, and we have reached the acme of steam piping at the present stage of steam engineering. It is true that in mercantile work such piping with welded flanges is too expensive and difficult to get to be used in the majority of cases. A good substitute is made by expanding the pipe into the flange and turning it over into a recess formed in the flange for this purpose, as illustrated at

time ago, but met with no extensive sale, owing to defects in its mechanical details. The device is a pipe elbow adjustable to any angle from 90 to 180 degrees—that is, from a 90-degree ell to a straight run coupling or union—although not possessing the essential qualities of the usual union, either in cheapness or adaptability. The device is shown in principle by Figs. 9 and 10, the two illustrations representing the two extreme positions. For either of these extremes the standard fittings are in most cases preferable, and it is only in the intermediate positions that Mr. Forbes' device is, in general, desirable. As seen in the illustrations, what might be called a globe coupling is cut at 45 degrees with the axis, the two parts A and B being fitted together, male and female, by a ground joint, F F. The bolt C serves to hold the parts together with pressure sufficient to prevent leakage at the ground joint F F, while leakage around the head of the bolt is avoided by the hard gasket D, upon which the shoulder E under the bolt head bears. The tapped hole for the threaded end of the bolt is not drilled clear through; thus there is no leakage at this point. In marine work odd angles in piping are of frequent occurrence.

and a fitting of this sort is of obvious advantage in avoiding bends and other makeshifts to accommodate standard fittings. The device previously brought out by an independent inventor, so Mr. Forbes stated, contemplated the joining of the parts A and B by such a joint as is used in the standard union for small pipe sizes. To defects in the design of this feature Mr. Forbes attributes the failure of the fitting to come into more general use. In the case of the device here illustrated the joint F F may be loosened by slackening off the bolt C, so that the piping entering the parts A and B may take its natural form, after which the bolt may be tightened, locking the halves into final position and making all joints tight. In steam heating work this fitting may often serve as a corner union with evident advantage. Other uses for the device in all classes of work will suggest themselves, and the manufacture of the fitting is open to any one, as Mr. Forbes has not patented it and does not produce it for market.

Mr. Lovekin of Philadelphia was invited to contribute to the discussion an account of work done by him in the way of adapting a machine for expanding flues to the work of expanding piping into flanges of a special form. Mr. Lovekin spoke at length relative to his experimenting along this line and reported the gratifying results of some severe hydraulic pressure tests of flange joints made after the form shown by Fig. 11. Instead of turning the pipe end over at 90 degrees for a distance equal to its thickness, as is the standard requirement for the work shown in Fig. 7, he flared a longer portion of the pipe end to an angle of 20 degrees, as in Fig. 11. In addition, three grooves around the interior of the flange bore, each 1/4 inch wide and from 1-64 to 1-32 inch deep, were made. The expanding of the pipe by the machine mentioned worked the pipe well into these grooves, completely filling those of 1-64 inch depth and nearly filling the deeper ones. Tests of short sections of pipe fitted with these flanges showed that the holding value of the grooved flanges was exceedingly high and that on copper pipes a fourth groove would probably result in pulling the pipe apart lengthwise before the flanges would strip off.

Commenting upon Mr. Lovekin's experiments, Mr. Newman expressed the opinion that expanded joints would not be best for steam piping for high pressures, the considerable ranges of expansion and contraction tending to loosen the flanges due to the permanent compression of the pipe (reducing its diameter) by the action of the flanges at high temperatures. This effect is already familiar in high pressure boiler practice, where the tubes loosen in the tube sheets and leak in comparatively short times after their placing in position. The frequency with which locomotive boilers require attention from this very cause is well known. It was urged that steel pipe with rolled flanges is the best piping at the present time, and that it may now be had at reasonable cost.

Iron and Steel Imports and Exports.

Herewith we present the statistics of our imports and exports of iron and steel for the months of September and October. It will be observed that the October imports were slightly in excess of those of September. This is partly due to the fact that for the first time the figures for structural iron and steel have been separately published by the Bureau of Statistics of the Department of Commerce and Labor. They were formerly included under the heading "All Other," for which values only were given. The increased imports in October can be regarded as only a temporary incident, representing continued receipts on orders placed abroad months since, when the demand for iron and steel was so insistent. Following are the tables of imports:

Commodities.	September.		Nine months.	
	1903.	1902.	1903.	1902.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron.....	16,414	82,196	547,386	339,406
Scrap	1,964	13,079	73,553	75,488
Bar iron.....	2,362	6,574	32,004	21,120
Rails	2,190	11,560	87,561	35,023
Hoop, band and scroll....	42	117	1,227	3,386
Billets, slabs, bars, &c., steel in forms n.e.s.....	13,530	27,727	243,193	189,676

Sheets and plates.....	1,057	471	7,947	4,696
Tin plates and terne plates	2,440	4,396	36,212	46,872
Wire rods	1,399	1,338	15,318	14,108
Wire and articles made from	470	154	3,747	2,467
Chains	24	18	323	233
Anvils	21	12	142	79
Totals.....	41,919	147,642	1,048,613	732,554
October.				
1903.		1902.		Ten months.
Gross tons.		Gross tons.		1903.
Commodities.		Gross tons.		1902.
Pig iron.....	18,704	67,204	566,090	406,610
Scrap	3,836	11,371	77,389	86,859
Bar iron.....	4,872	2,396	36,876	23,516
Rails	2,821	14,365	90,382	49,388
Hoop, band and scroll....	55	9	1,282	3,395
Billets, slabs, bars, &c., steel in forms n.e.s.....	10,343	32,036	253,536	221,712
Sheets and plates.....	265	437	8,212	5,133
Tin plates and terne plates	3,937	2,716	40,149	49,588
Wire rods.....	1,717	2,584	17,035	16,692
Wire and articles made from	406	384	4,153	2,801
*Structural iron and steel	1,397	33	.....	.....
Chains	17	287	340	520
Anvils	29	.....	171	79
Totals.....	48,399	133,772	1,095,615	866,293

* Included in "All other" prior to July 1, 1903.

The statistics of exports show a material increase in October over the figures for September. This increase more than offsets the increased imports. The tables for the two months are as follows:

Commodities.	September.		Nine months.	
	1903.	1902.	1903.	1902.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron.....	1,120	1,298	11,544	23,501
Scrap	202	1,019	3,130	7,778
Bar iron.....	1,305	1,859	15,284	18,713
Wire rods.....	683	496	19,074	15,247
Steel bars.....	532	640	13,785	7,661
Billets, ingots, blooms....	37	270	1,056	2,064
Hoop, band, scroll.....	126	81	1,428	1,396
Iron rails.....	.....	33	498	210
Steel rails.....	6,487	3,035	11,261	62,621
Iron sheets and plates....	1,693	198	4,358	2,881
Steel sheets and plates....	518	1,029	9,083	11,680
Tin plates and terne plates	1	70	168	1,375
Structural iron and steel..	1,805	4,122	22,565	45,970
Wire	6,110	5,202	76,285	72,010
Cut nails.....	1,059	475	6,789	5,573
Wire nails.....	1,950	1,704	22,389	19,398
All other, including tacks.	168	132	1,637	1,384
Totals.....	23,886	21,672	220,334	299,462
October.				
1903.		1902.		Ten months.
Gross tons.		Gross tons.		1903.
Commodities.		Gross tons.		1902.
Pig iron.....	1,550	1,073	13,094	24,574
Scrap	1,261	404	4,391	8,182
Bar iron.....	1,653	235	16,937	18,948
Wire rods.....	1,483	3,001	20,557	18,248
Steel bars.....	718	598	14,503	8,259
Billets, ingots, blooms....	28	125	1,084	2,189
Hoop, band, scroll.....	194	75	1,622	1,471
Iron rails.....	.....	.....	498	210
Steel rails.....	6,379	2,195	17,640	64,816
Iron sheets and plates....	144	257	4,502	3,138
Steel sheets and plates....	1,050	627	10,133	12,307
Tin plates and terne plates	2	53	170	1,428
Structural iron and steel..	2,528	3,813	25,093	49,783
Wire	11,973	12,071	88,258	84,081
Cut nails.....	933	581	7,722	6,154
Wire nails.....	3,251	2,943	25,640	22,341
All other, including tacks.	298	156	1,935	1,540
Totals.....	38,445	28,207	253,779	327,669

The above tables only include commodities for which quantities are given. The total value of imports of iron and steel, including manufactured products but excluding iron ore, was \$37,204,609 in the ten months of 1903, against \$31,987,868 in the corresponding period of 1902. The total values of similar exports, respectively, were \$81,696,786 and \$82,016,750.

P. Eckhart Slaymaker of Lancaster and C. C. Kauffman of Columbia have been appointed receivers for the Susquehanna Iron & Steel Company, Columbia, Pa. The application for the receivership was made some time ago by John Q. Denney of Columbia, but the management of

the company opposed the appointment, and Judge Landis, before whom the application was made, refused to appoint a receiver or dismiss the petition, but gave the company until January 1 to establish a stable basis. On November 30 counsel for the management filed a statement in which he said they were convinced they could not show a financial condition on January 1 satisfactory to the court, and therefore prayed that the receivers be appointed.

The New Johnson Friction Clutch.

The illustrations show the construction and appearance of a new friction clutch, designed by Carlyle Johnson of Hartford, Conn., and intended to involve principles of action dictated by the long experience of the inventor with various of the clutches already upon the market. It is to be noted that the clutch is round and presents smooth surfaces, without set screws or other protruding parts to offer elements of danger to operatives or others who may be associated with it. The forces which must be applied to the shifter levers for engaging and releasing the clutch are stated as being very light, an ordinary countershaft size requiring only from 2 to

when the sliding collar is withdrawn to release the clutch.

Working parts are well covered to prevent access of dirt. It is stated that, as the clutch is perfectly balanced, and as its construction is such as to be not affected by centrifugal force, very high speeds are entirely practicable. Fig. 1 shows a 12-inch pulley mounted upon the sleeve of a No. 4 clutch. The weight of the clutch complete, without the pulley, is given as 15 pounds. The space on the shaft outside the rim line of the pulley is stated as being only 5 3-16 inches. Fig. 1 shows the sliding collar forced to the left, the clutch being closed or engaged for driving the pulley. Fig. 2 represents the clutch and sleeve alone, the parts being in released position. In Fig. 3 is illustrated a double or duplex clutch with two sleeves for mounting two countershaft pulleys for reverse motion driving. In the duplex clutch the sleeves and friction cup are simply duplicated for each end. The sliding collar and body piece with friction ring segments, as also the sliding wedges, are made double ended. The arrangement is such that for central position of the sliding collar neither clutch is engaged, while a movement either way closes the corresponding clutch while the other remains open.

The Carlyle Johnson Machine Company, at Hartford,

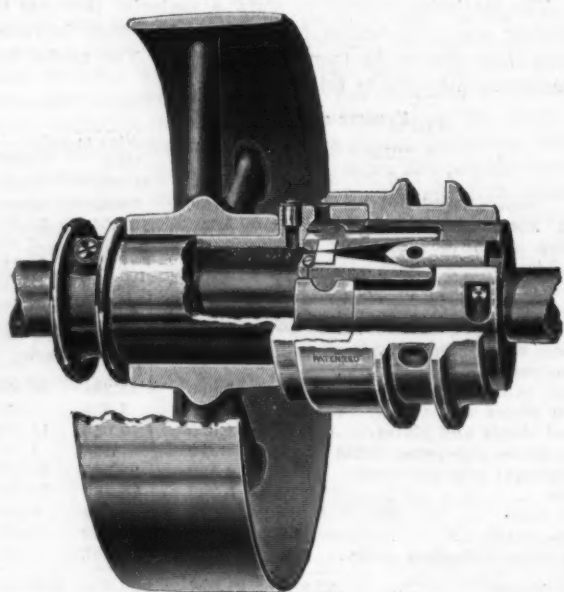


Fig. 1.—Clutch Closed, with Pulley.

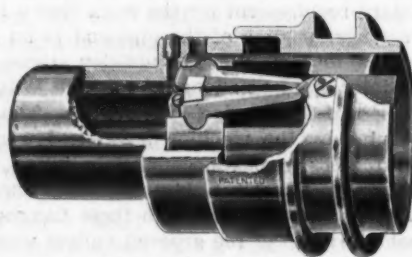


Fig. 2.—Clutch Open, without Pulley.

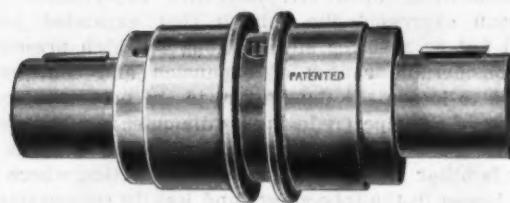


Fig. 3.—Duplex Clutch, without Pulleys.

THE NEW JOHNSON FRICTION CLUTCH.

5 pounds of pressure upon the sliding collar. Other sizes require correspondingly greater or less pressures. The essentials of the clutch include a friction cup attached to a long hub or sleeve upon which may be mounted a pulley, sheave, gear or other working part of a machine or power transmission system. A peculiarly formed body piece, best shown in Fig. 1, is securely fastened to the shaft and carries at its left hand end, as seen in the illustration, the two segments of a friction ring, which come within the friction cup already referred to. Between the segments of the friction ring, at either side of the shaft, are fitted small levers acting upon the toggle joint principle to expand the friction ring against the interior of the friction cup when the pointed sliding pieces actuated by the sliding collar are forced between the ends of the toggle levers. It may be readily seen that the very slightest elasticity in the friction ring segments will be effective in allowing a quite uniform pressure of contact between the segments and the cup, thus giving a good frictional driving capacity. The power of the wedge actuated toggle levers is evidently great, the leverage being highly compounded. Adjustment of the pressure between the friction ring and cup is neatly effected by means of a slotted head screw in one of the levers, its action being to advance or slacken one of the toggle joint contact pieces. Access to this screw is had through a hole suitably placed in the friction cup and uncovered

Conn., are now manufacturing these clutches, and are prepared to supply sizes and forms for a wide range of service conditions.

At Pittsburgh, in the suit of W. J. Alford of Anderson, Ind., vs. W. H. Donner, president of the Union Steel Company, the United States Circuit Court gave a verdict for the plaintiff of \$22,586.40. James W. Kinnear was attorney for the plaintiff, and Reed, Smith, Shaw & Beal appeared for Donner. The jury thus decided that letters exchanged between Alford and Donner constituted a contract, by which Donner agreed to give to Alford what 720 shares of the Sharon Steel Company would bring after consolidation with the Union Steel Company, Alford to pay \$126,000, the consideration being that he was to use his influence to bring about the consolidation. The United States Steel Corporation bought the stock of the consolidated company, which issued bonds to pay the stockholders, instead of giving them stock. The corporation guaranteed principal and interest of the bonds. Pending the deal with the United States Steel Corporation, the stock of the consolidated company went up, and when the sale was finally made the 720 shares brought \$148,586.40, the difference between that amount and the \$126,000 which Alford was to pay being the amount the jury found for.

New Publication.

Organized Labor: Its Problems, Purposes and Ideals, and the Present and Future of American Wage Earners. By John Mitchell. American Book and Bible House, Philadelphia, Pa.

"Organized Labor" is a book written by a man with well defined limitations of intelligence and education. He does not know as much as most well informed men who do not write books, about the history of human development, the natural laws of economic and social relations, or the tendencies which are shaping the progress of civilization. He has absorbed more or less undigested information from the writings of others and has the trick of appearing to be a student of the subjects he treats. As a matter of fact he is a very crude and immature thinker, illogical, impulsive, credulous and superficial. His ability to conceal the absence of original thought behind a tissue of words, which sound well but will not bear analysis, probably accounts for his prominence in the labor movement, but it does not invest him with the power to make a valuable contribution to economic literature. At the moment Mitchell ranks among the most prominent labor leaders of the country. His success was gained in a memorable contest which was won only because the forces opposed to him were managed with incapacity. Had the anthracite strike of 1902 failed, he would have joined Irons, Debs, Shaffer and many others in discredited obscurity. But having "won out" and established himself at the head of what is said to be the largest and strongest trade union in the world, he is for the moment a great man, sure of attention when he speaks and deemed competent to solve the problem of the purposes, ideals and tendencies of the labor movement.

It would be an injustice to Mr. Mitchell not to say that in his book he, or more probably his collaborator, Dr. Walter E. Weyl, has made an honest and sincere, if unsuccessful, effort to make the trade union movement appear as a beneficent social revolution from which, whatever its errors and excesses, great things may be expected for the welfare of mankind. It may be that this view of the function of the trade union is correct. It is not established, however, by sophistries in argument, by unblushing denials of facts known to all men, by smooth and sophistical apologies for crimes and conspiracies which menace the fundamental institutions of the commonwealth, by the defence of practices, which if tolerated will destroy the supremacy of law and erect anarchy in its stead, nor by reasoning from false premises to mistaken conclusions. We are quite willing to believe that Mr. Mitchell's sins in these respects are sins of ignorance, and that he is honest according to his light. But his light is not sufficiently luminous to warrant him in assuming to be a leader of thought or a teacher of men. Probably he cared very little how his book would be regarded by unprejudiced students of labor questions. He may even have expected criticism hostile to the point of condemnation. His audience comprises the partisans of the trade union movement. To stand well with them and win their applause would permit him to be quite indifferent to what others thought of his book. This would naturally warp original honesty of purpose in the writing of it, and give us in the net result pretty much what we find in its 51 chapters.

The author's point of view, or that which he elects to assume, may be judged from the first paragraph of his preface, which is like

"The harper's prelude e'er he smites the strings,
The prima donna's curtsy e'er she sings."

It sounds the keynote in glittering generalities. The sentences referred to are as follows:

"The average wage earner has made up his mind that he must remain a wage earner. He has given up hope of a kingdom to come, where he himself will be a capitalist, and he asks that the reward for his work be given him as a workman."

If this was true it would be the saddest fact ever recorded since civilization began. But it is not true, and it will be a sorry day for this country if it ever becomes true. In the next paragraph we find the following:

"They (the trade unions) are of a class, because that class exists and has class interests; but the unions do not create and do not perpetuate the class or its interests, and do not seek to evoke a class conflict."

Here in two paragraphs, standing in succession as expressions of two phases of one thought, or as a basic proposition and its corollary, we have a dangerous heresy stated with the gravity of an indisputable truth. When did the American wage earner make up his mind that he must remain a wage earner and content himself with the fact of permanent exclusion from the ranks of the capitalists? He may not expect to be a multimillionaire, although many wage earners have become so. He may have the intelligence to see that he lacks the qualities which would fit him to take rank as a captain of industry. But that he does not expect and desire to acquire property, to have a surplus for investment, which by its earnings will supplement the earnings of his hands, to own a home for his family and make provision for his old age, is true only of the worthless and improvident. Still further from the truth is it that the intelligent and ambitious wage earner recognizes himself as a member of a "class" separated from other classes by the impassable barriers of caste and chained to the bench as the galley slave to his oar. If the unions inculcate this false notion of class isolation it is not surprising that the utmost efforts of the propaganda have accomplished the organization of only some 18 per cent. of the wage earners of the United States. A somewhat higher flight of imagination is found in the following definition of what the trade union stands for:

"The trade unions stand for the principle of united action and for the policy of a living wage earned under fair living conditions. In union there is strength, justice and moderation; in disunion nothing but an alternating humility and insolence, a state of industrial despotism tempered by futile revolutions. Unions stand for the right of association, self government and free speech, for the dignity and self respect of the workman, for the mutual esteem of capitalist and wage earner, and for a wide, far-seeing, open-minded, democratic conduct of industry."

Unfortunately, they stand for a great deal else which is not so attractive. For example: For the destruction of individuality and the subordination of manhood to the will of an irresponsible junta; for the crushing of freedom of thought and speech when these conflict with the plans and purposes of the aggressive and intolerant minority; for crime and violence when these are needed to drive the unaffiliated mechanic from his job; for mob rule and the incendiary torch when employers need to be coerced; for defiance of law, a disregard of the rights of the public and the terrorizing of communities when strikes meet with resistance; for the "flying wedge," the "white squadron," the "entertainment committee," and other agencies of discouraging freedom of contract and liberty of individual action. The great labor leader yet to arise is the one who will have the courage to say of such crimes that they outrage civilization; to demand and enforce the expulsion from fellowship with organized labor unions which permit such crimes, or are content to profit by them and leave their perpetrators unwhipped of justice; to promise and render the assistance which every good citizen should give in maintaining the supremacy of law; to defend individual liberty and confess that a union which can offer labor no inducement to join it, save the hope of escaping the dire penalties of refusal, has no excuse for being and no right to exist, and who is strong enough to hold in wholesome check the blatant demagogues of the labor movement, who are now most in evidence as its accredited representatives and agents. He must also have the moral courage to denounce grafting in all its forms, and to defend the employer against trade brigandage. Mitchell is capable of none of these things. His nearest approach to it is to say, "Labor leaders have erred, but the underlying impulse has been good, and the unions have sought the welfare of their class and of society."

The first 12 chapters of the book, being mainly historical, are not without interest, but as history their value is microscopic. One searches them in vain for a

single fact of interest more clearly and intelligently stated than he might expect to find in a stump speech at a convention of coal miners. The object in view in these 12 chapters seems to have been to make it appear that from the beginning of modern industry the tendency of labor was steadily toward hopeless enslavement, and that all it has gained is due to the intervention of the trade union for its advancement and protection. The fact is lost sight of, or ignored, that the benefit of the wage earner has resulted from the conditions he most strenuously opposed and resisted. So far from being to his disadvantage, the modern factory system and the development of labor saving machinery have co-operated to uplift him, to increase his productiveness and make his labor more valuable. The improvement in his condition has been steady and continuous, and he has done very little to help it, but much to retard and embarrass the operation of natural laws from which he has chiefly benefited. Nothing of real advantage to him has come through the trade union. One gathering isolated facts at random from second and third hand compilations can make them seem to establish almost any contention, and this appears to have been the object, or at least the net result, of the author's historical researches.

In the chapter (XIII) on the benefit features of trade unions, we have some interesting English figures, and some very much less complete and interesting relating to the few unions in this country which have developed the scheme of sick benefits and death indemnity.

He concludes his chapter on this subject by advising the unions which may hereafter incorporate benefit features into their scheme of organization to "exercise great care in keeping the insurance features incidental to the trade policy, and to the primary objects of the unions, which are, and must always be, to raise wages, lessen hours and improve the general conditions of employment."

In discussing the American standard of wages, Mr. Mitchell, we find a statement, which we hope is true, but concerning which the average reader would be apt to say with the Scotchman: "I ha'e me doots." It is: "Wages do not always increase the cost of production, since the workman becomes more efficient when he is better paid, better fed, better clothed and better housed." This should be so, no doubt, but whether it is or not is a matter of question. A consensus of intelligent opinion would probably point to the conclusion that as the workman becomes more efficient he is better paid and enjoys the advantages which larger earnings command. This would certainly be true if the union did not interpose to introduce an artificial scale of wages, by which the inferior man gets more than he could earn if the superior man did not sacrifice his advantage and remain content with less than the employer would gladly give him. Mr. Mitchell's picture of the proper standard of living for the ordinary unskilled workman with an average family has for its incidents a comfortable house of not less than six rooms, a bathroom, sanitary plumbing, a parlor, dining room, kitchen, ample sleeping accommodations, carpets, pictures, books, attractive furniture, assorted clothing for all seasons, a generous table, schooling for his children up to the age of 16 at least, and a savings bank account sufficient to meet the costs of sickness and provide support for old age. No one would object to this as an abstract proposition. Mr. Mitchell thinks that to attain the standard he describes every unskilled workman should earn not less than \$600 per year. Granted that he does, he will need very good management to "make ends meet." How the skilled mechanic should live we are not told specifically; but the question arises, Why should he live any better than the unskilled man? Is it equitable that he shall be the aristocrat of the labor movement? Should he not sacrifice for the benefit of his unskilled brother any advantage which comes to him from knowing how to do something—a mere accident of birth, early education or favoring opportunity—and pool his larger earnings with those of the less fortunate man for an equal per capita division every Saturday night? This would be ideally altruistic. It does not appear to be suggested anywhere in the book. Perhaps the "certificated"

miners would like to divide in this way with their helpers.

The chapter on The Day's Work (XV) is an interesting summary of the struggle of the unions for the eight-hour standard. It is superficial and not convincing. In the chapter which discusses the Moral Uplifting of the Workman (XVIII) we are met at the outset with the following interesting proposition: "Those who look at the surface of things and judge trade unionism by an occasional glimpse are likely to fail signally to appreciate the uplifting influence of this institution upon the character of the wage earners." Very likely; but it is even less obvious to those who see and know what is really going on within this institution. Again: "The trade union, like the Church, teaches the lesson of brotherhood." It would seem to teach that the man with the card is a brother, but that the independent worker is an outcast and a pariah, against whom every brother's hand is properly lifted.

The chapters devoted to lauding the trade unions and exploiting the great good which has come from them to employers as well as to labor are interesting, but discourage review from the fact that they are debatable in every sentence, and almost every line. Mr. Mitchell "holds a brief" for the unions, and naturally makes the best he can of their case, but he shows his lack of skill as a special pleader in ignoring the questions and objections which suggest themselves to the reader, and which, if unanswered, discredit his argument. His basis of hope for the betterment of the condition of unskilled labor is this: "By means of the label and the boycott, by moral and financial support during strikes, by sympathy and encouragement at all times, the more skilled workmen can aid the less skilled and can indirectly promote their own welfare by protecting the welfare of the less fortunate." None of these things are possible, however, until unskilled labor is thoroughly organized and can be used by skilled labor to pull its chestnuts out of the fire. Immigration, he thinks, should be so restricted as to exclude from this country every man not capable on landing of earning the standard union wage.

In the discussion of the relations of organized capital and organized labor Mr. Mitchell opens with the surprising proposition that "perhaps the fullest recognition of the power and necessity for trade unions is furnished by the organization of employers." This would seem to involve a reversal of the telescope, or else to be prophetic. It has been assumed that the power and growth of the trade unions rendered necessary the formation of employers' unions to deal with them on equal terms. His discussion of trusts is not instructive. He does not understand the subject he discusses, which is not surprising.

Perhaps the keynote of the book, in its discussion of the interests of labor, is its insistence upon the postulate that the individual is not only unable but incompetent to think or act for himself—that the destruction of the workingman is the individual bargain and his salvation the joint, united or collective bargain. On this the changes are rung with no little ingenuity, and very little of what the average reader will regard as honesty. Those who believe this will agree with it; those who do not will not find the book under review either convincing or persuasive. If that was all that Mitchell attempts it would be of no great consequence if he was right or wrong; but he goes much further, and deals apologetically or defensively with a great many things incident to the practical operation of trade unionism which are distinctly dangerous and destructive of our national institutions. This objection applies with great force to the chapter (XXV) on Trade Unions, the State and the Law. Equally open to reproof is the chapter on The Injunction in Labor Disputes (XXXVII), in which the injunction is discussed with entire disregard of the facts and in a way to place organized labor in an attitude of hostility to the law and defiance of its safeguards. So far as we are aware, or can learn, the only acts of organized labor ever restrained or forbidden by injunction are those in themselves illegal in the circumstances, and inimical to the public peace and well-being. Some imprudent and ill advised *obiter dicta* are quoted as showing the condition

of the judicial mind in the hearings which have followed the issuance of injunctions—notably those of Judge Jackson of West Virginia; but *obiter dicta* are not law and they break no bones.

The several chapters in which is given the history of the anthracite strike of 1902 are interesting, but much less instructive to one who wishes to understand that important event than the record of the testimony taken by the strike commission. It is an *ex parte* statement of the case, which contains one admission more frank and more illuminating than we should have expected to find in the narrative. It is this:

"During the first week of August a crisis was reached. The agents of the companies circulated rumors among the strikers to the effect that the money contributed by the bituminous miners was being withheld, if not actually misappropriated. I am fully convinced that the strike would have collapsed if the operators at this time had opened their mines and invited the strikers to return to work."

The only people who did not think at the time what Mr. Mitchell now admits were those responsible for the conduct of the strike for the operators.

The book is one which will disappoint a reader who takes it up with sympathy for labor in every effort to better its condition, and reads it in the hope of finding therein a basis for his hope that in Mitchell a leader has arisen who towers above the plane of the demagogue and sees where present tendencies are leading, and how new and better tendencies may be set in motion. On the other hand, it will no doubt serve its purpose with those for whom it was written, and furnish excuses for any excesses which may seem necessary as "acts of war" against the cruel and heartless "capitalist," who fattens on the earnings of the unfortunate victims of his greed. Those who dislike and distrust him will have reason for congratulation that he has written this book; those who wish him well will regret that he did not make better use of a unique opportunity to render organized labor and society a service of lasting benefit.

Scientific and Technical Notes.

The manufacture of anhydrous paper, which forms the best casing for underground telegraph and telephone cables, became some time ago an important industry in England, but is now being transferred to this country because of the comparative dryness of our climate.

Our earth is constantly picking up unconsidered trifles of star dust, which range all the way from the 13-foot long mass of meteoric rock lately found by Professor Ward in Mexico down to the infinitesimal particles which are found on the roof of St. Paul's, on the Arctic snows, and at the bottom of the sea. It is calculated that the total amount of matter thus absorbed by us is certainly not less than 500,000 tons a year, and that, therefore, the weight of the world is increasing by that amount every 12 months.

The skoboscopic method of investigation is being practically applied to engineering purposes. This beautiful principle is the same as that well known in connection with the zoetrope and similar toys, in which a succession of moving objects, viewed through slits in a rotating drum or disk, appear to have the movements of life. By examining a rapidly moving piece of mechanism with closely succeeding flashes of light, the parts may be caused to appear as standing still, and any desired stage or phase of operations may be studied minutely under all the actual conditions of rapid movement.

Experiments have recently been made for the purpose of ascertaining the relative durability of various kinds of wood; the method consisting of driving into the ground sticks 2 feet long and 1½ inches square, and leaving them there for a period of five years. When the sticks were unearthed the results were found to be as follows: Oak, elm, ash, fir and soft mahogany were entirely decayed.

Larch and hard pine were decayed on the outside only. Cedar of Lebanon and hard mahogany were in fairly good condition, while Virginia cedar was found as good and sound as when first put into the ground.

Tidal power has been utilized in only a very small way; its large use has always been considered dubious. The only tidal powers to be taken seriously as able to count in large work are such as exist in exceptional spots, like the Bay of Fundy, where the tides run 40 feet high under normal conditions. There it should be possible to obtain, for two five-hour runs, more than 50,000 horse-power per square mile of reservoir. The inner extremity of the Bay of Fundy is almost a tidal lake, known as the Basin of Minas. At its outlet rise two great headlands, less than 3 miles apart, while the narrow tide race between them takes the full current for the basin within. This covers an area of more than 400 square miles, so that it is safe to say that through that narrow gap more than 200,000,000 horse-power hours run daily to waste. To utilize it would require an engineering feat more tremendous than anything yet attempted by man, but in years to come it may be found worth while to make a serious attempt to do so.

The recent teaching that the ear is an hydraulic and not a pneumatic apparatus, and that, therefore, hearing is brought under the common law of the apparatus of sensation, is elaborated in "The Ear a Manometer," by M. Bounier. He says that the liquid of the interior ear moves as a whole, so that audition is a hydrodynamic, not an acoustic, phenomenon. Thus the ear is not a resonator, but a registering manometer, in which variations of pressure are alone recorded.

Doctor Lebon of Paris was experimenting in Hertzian waves in his laboratory when suddenly he was surrounded by a rain of fire dropping from all the metallic objects in the room. The incident leads the experimenter to conclude that it would be possible to construct huge metallic mirrors capable of reflecting Hertzian rays several miles. They would be visible, and would ignite distant explosives, such as magazines, torpedoes aboard or afloat, shells and even cartridges in soldiers' belts.

The British Government continuously carries on the work of charting the ocean's bed—work the benefits of which are shared by all maritime nations. Last year 11 vessels were thus engaged, with 78 officers and 781 men. Altogether 318 rocks and shoals dangerous to navigation were reported, 39 by the surveying vessels, 20 by others of the British Government ships, and 19 by foreign vessels. Eleven were discovered as a result of a ship's striking on them, and 223 were reported by colonial and foreign governments. Altogether 1924 miles of coast line were charted and an area of 12,661 square miles sounded.

A recent invention adapted to make use of the rolling motion of a ship at sea for the purpose of operating the pumps consists of a trough, hinged at the center to a standard, and secured at its outer ends to the handles of the pumps. A heavy ball carried in the trough is set in periodic motion by the rolling, rocking the trough up and down and accomplishing the desired result. Since the weight of the pumps is practically balanced when two are worked together, the weight of the ball need be but little greater than the weight of water lifted at a single strike of one of the pistons.

The new dock which is being built at Boulogne, and which is to be called the Bassin Loubet, is to be a deep tidal dock, without gates, rectangular in form, and is to cover 16 acres. The north and south quays are each to be 350 m. in length, the west side 220, and the east side, on which is the entrance, is protected by a quay of a length of 165 m. At low spring tides the depth of water along the north quay will be 4 m., while along the south quay there will be 8 m., thus allowing ocean liners to lie alongside.

The Birchenough South African Report.

LONDON, November 21, 1903.—The report published this week by Henry Birchenough, the special commissioner appointed by the British Board of Trade to inquire into and report upon the present position and future prospects of British trade in South Africa, is the most important document that has yet been printed upon the commercial position in that part of the globe. I would strongly recommend all American manufacturers and exporters who now have, or in the future hope to have, trade connections with South Africa to procure a copy and thoroughly study it for themselves. It is to be obtained in this country for 30 cents. It runs to 160 pages, and certainly over 100 of them have more or less close relation with the iron and steel, machinery and metal trades.

Mr. Birchenough very wisely devotes his attention more to future than to immediate prospects, because he recognizes that at the present moment the commercial situation in South Africa is in an abnormal and transitional stage. The dislocation of business consequent upon the war has not yet been straightened out, and the great changes involved in the war are not yet completely gauged. Another disturbing element at the moment is the effect which the inter-colonial customs agreement will have upon trade. This agreement was signed at Bloemfontein on March 23, and is now in operation. All transit dues are abolished, and considerable reductions are made in through railway rates. In addition, there is the slight preference given to Great Britain. Another difficulty has been purely statistical. It is not wise to draw deductions from the 1902 statistics, coming so closely, as they do, after the war.

The special commissioner has done wisely to regard South Africa as a single market. He recognizes that politically, socially and economically the various South African colonies differ from each other in varying degrees. But speaking broadly, the general character of the purchasers in all the colonies is the same. The explanation of this, he thinks, is to be found in the fact that a large part of the trade of South Africa passes through the hands of large importing firms, who have houses in all the principal trade centers. Some of them have their headquarters at the ports, with branch houses in the inland towns, while others reverse this arrangement. Practically all these firms have buying houses or agencies in Great Britain (generally in London), and a very large proportion of Continental and American produce and manufactures which find their way to South Africa are purchased through London and pay London either a profit or a commission.

Magnitude of the South African Market.

It is difficult to ascertain the amount of direct trading with Europe and America. With the former it is not great; with the latter it is already large and rapidly growing. Taking South Africa as a single market, exporters will note that all imports finding their way into South Africa come through the five great sea gates—Cape Town, Port Elizabeth, East London, Durban and Delagoa Bay. Cape Town at the present moment does actually the largest trade, and is likely so to continue, for passenger traffic. It is probable, however, that in the long run Durban will become the chief port of entry, because, on the whole, it presents the least difficulty in getting goods into the Transvaal.

Mr. Birchenough has collected statistics of the trade of South Africa during the past ten years, from which the following figures are taken:

	Cape Colony.	Natal.	Other colonies.	Total.
1893.....	£11,344,284	£2,236,738	£280,138	£13,861,160
1895.....	13,587,025	2,469,303	901,649	16,957,977
1897.....	17,921,683	5,983,589	2,863,542	26,768,814
1900.....	17,161,514	5,911,518	*.....	23,699,818
1902.....	32,109,569	13,317,445	1,740,531	47,167,545

* No figures available.

It will be seen that in ten years the total imports have increased in value by nearly 250 per cent., by far the greatest increase taking place in the last two years.

The proportion of South African trade done as between Great Britain and other countries is next stated as follows:

Imports from	1897.	1899.	1900.	1902.
United Kingdom.....	£17,001,592	£13,405,539	£14,777,720	£29,247,743
British Possessions.....	1,243,697	2,143,810	3,626,798	5,517,858
Foreign countries.....	5,668,983	5,175,650	4,668,514	10,661,413

Totals.....£23,905,272 £20,724,999 £23,073,032 £45,427,014

As to whether this large trade is due to temporary causes, or may be regarded as permanent, he says:

It is often asserted that this sudden rise of South Africa in the markets of the world cannot last—that it is a sort of “straw fire,” due to the necessity for repairing the ravages of the war and repatriating the Boer prisoners. . . . That is not the impression I have formed. There is evidence to show that the progress of South Africa has been steadily upward for the last ten years, and that a more rapid advance was only retarded by the uncertainty caused by impending political changes. . . . All my inquiries lead me to believe the present is no temporary boom but the beginning of a period of great and sustained expansion. There may be, indeed there will be, setbacks, but, so far as I can judge, they will probably only be incidents—disappointing, no doubt, to individuals, but of no serious importance when looked at broadly—in a great chapter of commercial and industrial development.

The Gold Mining Industry.

The commissioner does not think that the Transvaal gold mining industry has at yet anything like reached its zenith. He says it is difficult to describe the prospects of the mining industry without apparent exaggeration. The present magnitude of the gold mining industry on the Witwatersrand is stated as follows:

1. The extent of the main reef continuously traced, which measures about 62 miles.

2. The value of the gold already recovered, which amounted to 25,000,000 ounces, valued at about £100,000,000, between 1887 and the end of 1902. The largest amount recovered in one clear year was in 1898, the year before the war, when the output was 4,295,608 ounces, valued at about £18,000,000. There were in that year about 6000 stamps running. The output of last year, 1902, with an average of 2092 stamps at work, was 1,690,101 ounces, valued at £7,179,074. This period, of course, includes four months before peace was concluded.

3. The capital invested. Taking only 120 companies controlled by the great groups, their nominal capital at the end of 1902 was £57,000,000, their issued capital over £53,000,000, their total capital expenditure upon development and equipment £37,000,000, the market valuation of their property £174,000,000, and they had paid up to date nearly £20,000,000 in dividends.

4. The value of machinery in use upon the mines, estimated by the Government Mining Engineer on June 30, 1902, at between £11,000,000 and £12,000,000, and considerably increased since that date.

5. The amount and value of stores annually consumed, which of themselves constitute a considerable market for imports. These are articles to satisfy daily requirements, and do not go into capital account. They include such items as coal, explosives, candles, timber, cyanide, galvanized iron, tools, picks and shovels, wire rope, pipes and fittings, trucks and rails, cement, zinc, &c. Their value during 1902, when the average number of stamps running was only 2100, was over £3,000,000, of which about £2,000,000 were imported goods. Before the war, when 6000 stamps were at work, these amounts were nearly doubled.

6. The number of men employed. In August, 1899, just before the war, the whites employed numbered about 12,000 and the natives about 100,000. There were 77 mines crushing, with 6070 stamps at work. At the end of December, 1902, there were 10,292 whites at work and 45,698 natives, with 48 mines crushing and 3010 stamps running. By the end of June, 1903, the number of natives had risen to about 60,000.

The Government mining engineer at Johannesburg, at the request of the British Commissioner makes the following calculation: “Assuming that the value of the imported machinery and plant for the gold mines at the Witwatersrand (less foundations, &c.,) amounts to £1600 per stamp, and that, say, 8000 additional stamps will be at work five years hence, then machinery to the value of £12,800,000 will be imported for these mines during the next five years. Further provision should be made for the equipment of 100 new shafts at a value of, say, £2,000,000, also for the equipment necessary for coal and other mines throughout the Transvaal at a value of, say, £2,200,000, thus making a total estimated value of £17,000,000 worth of machinery.”

Machinery Wanted in the Mining Centers.

From the report it is clear that considerable expenditure will have to be incurred in order to keep the equipment of the existing mines up to date, and the following departments are dealt with:

The labor difficulty has created a demand for labor saving appliances of all kinds, such as belt conveyors for

handling rock, sands, slimes and refuse, sorting belts, mechanical stokers, all forms of mechanical underground traction. The substitution of central electrical power stations upon each mine, or group of mines, in place of the present scattered plant will largely increase the demand for electrical machinery, such as generators, motors, electrically driven pumps, &c. Steel head gears are rapidly taking the place of timber head gears. There is also an inclination to substitute steel for timber, which is expensive and requires frequent renewal, in mine shafts, and to adopt the system of steel frame buildings, where practicable, upon the mines. Other items which may be mentioned as likely to afford new or extended openings for trade are improved diamond drills for deep boring, oil and gas engines, water purifiers, steam trolleys, steam lorries and traction engines, lighter but equally strong steel ropes for deep level mines, all labor saving inventions, especially in connection with underground traction and the working of drills.

Details of Machinery in Request:

The report by the Government Mining Engineer alluded to above contains particulars of the various kinds of machinery and mining appliances now in request on the Rand. The following points from this report, which appear as an appendix, are worth careful study:

The total number of rock drills in use on these fields is practically made up of three types, the Slugger and the Ingersoll-Sergeant, both made in the United States, and the Climax, which is of British manufacture. The two former types occupied a very commanding position up to a few years ago, but the British made drill has been since then a formidable competitor, and with the improvements recently effected in its efficiency and reduced weight, it is coming into very large general use, and has replaced the two former types at many mines.

Tram lines are of German make to a large extent, mainly because German houses obtained almost the monopoly of the trade in the early days, and have consequently been encouraged to maintain large and varied stocks in Johannesburg, which no one, starting on a small scale, could compete with, owing to the small profits associated with this class of goods rendering anything but an extensive trade unsuccessful commercially.

Trucks are largely in the hands of German and American makers, particularly the special kinds of bottom discharge and side tipping trucks.

Hauling engines until recently were imported from Great Britain almost exclusively, but of late years American makes have been installed to some extent. The first cost of these American hauling engines is considerably below the prices of British makers (say about 20 per cent.), and their periods of delivery are usually shorter and more punctually adhered to. The efficiency of these American engines is generally equal to that of British-made ones, and, in some respects, they are provided with special details that are of considerable value in manipulation and repair—e.g., various appliances for securing effective lubrication, the adjustment of bearings, speed governing and safety attachments in case of overwinding, &c. In the process of erecting one of these structures one very soon realizes that, contrary to the British practice, this has never been gone through before, as regards these particular parts, each one of which has been simply machined, along with numbers of its kind, and then placed in the stores until requisitioned as part of this or some other piece of machinery, and packed up for shipment. When at their destination the various details are brought together for the first time they go into their respective places with a facility marvelous to any one acquainted only with old fashioned shop methods, and there is very little "fitting" to do, certainly not more than with a British engine, supposed to have been completely erected at the makers' works. This positiveness in the fitting of two articles the first time they are brought together can only be attained by the system of standard gauges so generally adopted in American engineering shops. It has the further great advantage that any new parts that may be ordered by simply cabling the drawing number will to a certainty be complete and a perfect fit when they arrive, or should it be necessary to

replace any broken part immediately this can usually be done from any other engine of the same size and make that may happen to be in the country and not working.

The same remarks as made *re* hauling engines are generally applicable to air compressors. There are two American types of high repute and one English, but the bulk of orders for compressors go to the former country, where, as in other lines, a large experience has been gained in connection with their numerous metalliferous mines.

Stamp batteries are about equally divided between British and American firms, with a few of German make, but the British built batteries are usually preferred by managers, and these fully hold their own in the competition, notably the British forged steel shoes and dies. There is good scope for the invention of some stamp stem material that will withstand the inevitable result of severe vibration; mild steel rapidly crystallizes and breaks off short at the shoe, and soft iron is nearly as bad. A combination known as "iron fibered steel" would appear to be one of the best materials yet introduced for this purpose.

By far the larger number of steam boilers in use are of British make. In the early days the locomotive type was largely adopted; later on the cylindrical multitubular externally fired became general, as being well adapted for the quality of coal available, and it is still the most numerous represented class, but, owing to several inherent defects, it is being steadily supplanted by the water tube types, which are equally well suited for the generating of steam by means of Transvaal coal. It is to this type of boiler that makers ought to apply themselves, as far as the Transvaal gold mining industry is concerned in the future. As regards the quality of British made boilers compared with American and with some German, it is simply overwhelmingly superior, and this predominance has every appearance of being well maintained. For some reason or other, excellent as are their productions in many other branches of engineering, the bulk of American boiler makers seem quite unable to grasp the necessity of high-class work in constructing steam generators for modern high pressure. Their makers still adhere to punched rivet holes, roughly shorn plate edges, excessively thin plating, and outside caulking only (leaving gaping recesses on the inside), together with an execrable quality of fittings and attachments to boiler, the whole resulting in an apparatus to which no self-respecting tank builder would put his name.

A large number of American-built pumps of the duplex nonflywheel pattern and of the various types driven by electricity are being imported. The reason for the success of the former is the fact that several American makers of world wide repute have made a specialty of this type for many years past, during which time they have had the benefit of a vast experience, and been thus enabled to secure and maintain pre-eminent positions.

A very large quantity of American piping is in use and being continually imported. It is preferred by many engineers and by the men on account of the taper thread, which greatly facilitates the work of connecting and of securing a perfectly tight joint. It is also a little cheaper than the fine parallel thread British tube, and no fault is found with its quality.

Seven years ago fully three-fourths of the electrical machinery in use was of the two-phase continuous current type of British make, but since then the merits of the three-phase and alternating current have become so palpable that most new plants are of that type, and orders have gone to America, Germany and Switzerland on large scales.

The directions in which increased imports may be expected in the future are as follows: Electrically driven mechanical wire rope haulages above and possibly below ground; electrically driven pumps of all kinds for surface and underground; small sized light weight rock drills for stoping; steel slimes, tanks, valves, piping, and centrifugal pumps; wire ropes up to 1 inch diameter for mechanical haulages, and 1 to 1½ inches or more diameter for shaft winding; steel head gears; electric motors

for all purposes; engineers' machine tools; engineers' hand tools; iron framed buildings; water tube boilers; diamond drilling plant; mechanical conveyors of ore, &c., by rubber belting and otherwise; reciprocating rock breakers (which are now preferred to the rotary types); grizzly bars of hard steel for ore screens.

The American Share.

The foregoing points may be taken as representative of the other references in this report to the demand for machinery and mining appliances on the Rand district. Other reports appear from the inspectors of machinery at Pretoria, Barberton district, Klerksdorp district, Krugersdorp district, and from other recognized machinery authorities. It may be said, taking them in the mass, that they dot the i's and cross the t's of their Johannesburg chief. There are, however, one or two references to America worth noting. One inspector remarks that Americans in steam and Germans in electrical machinery excel in design, but the material and workmanship, especially American, are not so good as British. In considering the most reliable method to adopt in order to show how matters stand, information from 24 working mines was obtained, and the percentage of consumption placed under three different heads—namely: 1, American; 2, German, Belgian, &c.; 3, British. From this report it would appear that 17 per cent. of the boilers come from America, 3 per cent. German, 80 per cent. British. Winding engines, 14 per cent. American, 86 per cent. British; steel head gears, 17 per cent. American, 83 per cent. British; mill engines, 41 per cent. American, 3 per cent. German, 56 per cent. British; ore crushers, 55 per cent. American, 45 per cent. British; air drills, 76 per cent. American; 24 per cent. British; piping, 34 per cent. American, 66 per cent. British; drill steel, 1 per cent. American, 9 per cent. German, 90 per cent. British; wire rope, 2 per cent. American, 98 per cent. British; pumps, 25 per cent. American, 75 per cent. British; bolts and nuts, 15 per cent. American, 85 per cent. British; workshop machinery, 20 per cent. American, 1 per cent. German, 79 per cent. British.

Iron and Steel Rails.

Upon the colonial railways preference is given, wherever possible, to Great Britain. Quite recently the large contracts for 80-pound rails for relaying sections of the Central South African system have been placed in England. In the open market Belgium, Germany and the United States all compete, and in many cases successfully. As prices vary continually, it is useless to cite particular quotations, but it may be said generally that British prices for rails are frequently from 10 to 15 per cent. higher than Continental and American prices. The new duty of 2½ per cent., from which Great Britain is exempt, should prove of some little assistance to British manufacturers. In the case of light rails for tramways and hauling tracks, Germany has a strong hold upon the market, owing to the fact that an important German firm in South Africa keep an immense stock of rails of all weights (12, 16, 20, 35, 45, and 60 pounds), and can deliver at once for immediate requirements.

The tendency at present on the mines is to use heavier rails—20-pound and upwards. In inclined shafts 60, 80 and even 100 pound rails are used. In rails for municipal tramways there is likely to be very keen competition in view of the numerous schemes which are under consideration in the chief South African towns. Belgium has scored a first success by securing the contract for the supply of steel grooved rails and fish plates for the Johannesburg electrical tramways, at a price about 10 per cent. below the most suitable British tender, even after giving credit for the 2½ per cent. preferential duty in favor of Great Britain.

Construction Steel, Girders, Joists, Etc.

In this branch of trade competition is very keen between Great Britain, Belgium, Germany and America. Unfortunately the colonial import returns, except in the case of Natal, do not give a separate heading for this class of metal work, so it is impossible to quote any illustrative figures. Whatever America may become in the future, Belgium is a formidable competitor at the

present time, as, indeed, she is for similar work in the home market. In tendering for contracts it has become the custom to quote for both British and Continental steel. Even American firms are using Belgian steel in some of the skeleton frame buildings they are erecting in South Africa.

For a contract for 500 tons for a building in Cape Town the British price was 10 shillings per ton lower than the American, but lower freight from America caused the order to go to America. It is the general opinion in South Africa that the steel skeleton frame building has a great future before it. In all the large cities such buildings are in process of erection, and, so far, most of the contracts have gone to America. A New York firm came into the market with a large experience of the skyscraper type of building, and informed architects they were prepared to calculate weights and strains, to supply all details for plans and to quote prices, inclusive of erection. This naturally proved very attractive to architects, as it freed them from the necessity of employing skilled men themselves to make such calculations. The success of the American firm was immediate.

American Prospects in South Africa.

Running through the book from start to finish there is a sense of lively respect for the competitive powers of American manufacturers. Johannesburg is recognized to be the real battlefield of international competition, and we are told that the majority of consulting engineers are American, and their personal bias to some extent leads them either to favor American machinery or to draw their specifications in a manner which, in practice, confers an advantage upon American tenderers. Mr. Birch-enough thinks, however, that too much can be made of this. In the early days of the Rand a great deal of American machinery was brought on to the fields, because it was at the time best suited for the purpose. Since then engineers have had gradually to solve the particular problems presented to them by local conditions, and they have found that some classes of work can be done best in one country and some in another, so that they are much less disposed than before to confine themselves to any single source of supply. The result is that the equipment of the later developed mines is extremely cosmopolitan in its character. British, American, German and Swiss machinery are as often as not represented upon a single mine or group of mines. Then again, some of the great mining groups are connected financially with engineering concerns, and naturally put as much business as possible in their way. Thus the two German groups make a practice of giving the bulk of their orders to German makers.

S. G. H.

A Great Furnace Record.—Furnace No. 1 of the Carnegie Steel Company, at Duquesne, Pa., has just made a record for long blast on one lining and for output that will probably stand for some time. This stack was blown in on June 8, 1896, and was in continuous blast until October 21, 1903, a period of seven years, four months and a half. During its blast the furnace turned out 1,287,400 gross tons of Bessemer iron. The best day's record was on October 26, 1898, when the stack made 748 tons 350 pounds. The best week's work was for the week ending October 29, 1898, when the stack made 4990 tons 209 pounds. The best month's work was October, 1898, when the product of the furnace was 18,672 gross tons of Bessemer iron. The average coke consumption per ton of iron was 2020 pounds. This stack is 100 x 22 feet in size. It will be extensively repaired and relined, and is expected to be ready for blast again in about two months.

In a paper before the Verein Deutscher Ingenieure, Professor Schmoller of Berlin University stated that in 1850, when Germany had a population of 18,000,000, of whom one-half were laborers, the ratio of physical power exerted by the human factor in economic activity to the power exerted by machinery was unity. In 1895, when the population had become 56,000,000, with the same proportion of laborers, the ratio had become one to six, or, according to some authorities, one to ten.

The Iron Age

New York, Thursday, December 3, 1903.

DAVID WILLIAMS COMPANY,	-	-	-	-	-	-	-	PUBLISHERS.
CHARLES KIRCHHOFF,	-	-	-	-	-	-	-	EDITOR.
GEO. W. COPE,	-	-	-	-	-	-	-	ASSOCIATE EDITOR.
RICHARD R. WILLIAMS,	-	-	-	-	-	-	-	HARDWARE EDITOR.
JOHN B. KING,	-	-	-	-	-	-	-	BUSINESS MANAGER.

Mr. Hill's Currency Bill.

In view of the determination of the leading men in Congress to have no currency legislation this winter, the introduction of a bill on the subject does not possess much inherent importance. But some interest is imparted to the bill introduced by Mr. Hill by some very confident predictions that in his message to the regular session of Congress next week the President will recommend a few extremely moderate changes in the currency laws, and there is an implication that Mr. Hill's bill contains about what the President will advise. Even with the approval of the President it seems unlikely that the currency will receive any attention from Congress, but if it should the Hill bill ought to stand a good chance of passing, for it raises none of the issues that have excited warm discussions.

The bill would make customs collections subject to deposit in national banks, like internal revenue collections. Of course, there has been no reason for distinguishing between one kind of revenue and another since specie payments were resumed and the Government has not needed a special gold fund for the interest on its bonds. Yet the Speaker of the House has been reputed to be strongly opposed to increasing the deposits in the banks.

Mr. Hill would repeal the law which limits to \$3,000,000 the amount of national bank currency that may be retired in any one month. This law was passed by inflationists to prevent contraction. It has been a total failure for that purpose; and, on the other hand, it is notorious that it has prevented temporary increases of the currency. Secretary Shaw says that a year ago the banks would have put out \$50,000,000 more circulation had they been assured that they could retire their notes as fast as their customers ceased to need them. There are still reported to be gentlemen in Congress, however, who apprehend that the banks would violently contract the currency if it were not for this law, and who cannot understand the effect of the law in preventing expansion.

Several sections of the bill are designed to enable the Treasury to meet demands for currency in such denominations as the public calls for. Three years ago national banks were prohibited from having more than one-third of their circulation in \$5 bills. The purpose of this was to create room for silver certificates. Mr. Hill would repeal this provision and authorize the issue of \$10 gold certificates, the smallest now being \$20; thus there would be an additional supply of fives and tens to take the place of silver certificates of those denominations which are being replaced with ones and twos, for which there is a large demand. The bill would permit the Secretary to use his discretion in retiring any silver certificates and United States notes and issuing in their place equal amounts in other denominations. There is no substantial objection to this, and it would promote convenience. The bill would also permit silver dollars to be recoined into subsidiary pieces, and as the silver dollars are practically useless in a large part of the country there is no reason for buying bullion for small change.

The final section of the bill would make the tax on circulation uniform, regardless of the class of bonds deposited as security. The provision making the tax lower on notes secured by 2 per cent. bonds was designed to create a market for those bonds. They have been marketed so well that the discrimination in their favor is no longer necessary.

Mr. Hill does not call his bill a bill to reform the currency, but a bill "to improve currency conditions." It would accomplish that, and it would be a good thing to enact it provided that its enactment did not have the effect of deferring comprehensive action in the nature of a substantial reform.

The Shipbuilding Industry.

It would be easy to assume from recent occurrences in the shipbuilding industry that this branch of business is in a condition of decay. We have seen one of the oldest and best known shipbuilding companies on the Atlantic Coast compelled to reorganize and secure fresh capital for the purpose of continuing their existence as an active enterprise. Then came the failure of the United States Shipbuilding Company, the organization of which was attended with the claim by the promoters that the great scheme thus to be carried through would be of international importance, as the works amalgamated would be able to furnish anything from a yacht to a thoroughly equipped battle ship. We have further been treated to the discouraging spectacle of other shipbuilding enterprises which were apparently flourishing either forced to the wall through financial difficulties or kept alive by seeking assistance from outside capital. In the past month two important shipbuilding companies operating in the harbor of New York have become seriously embarrassed, with the result that one is idle and the other is expected to be completely reorganized.

To take the picture thus painted, and to treat the facts as baldly stated, would make a most discouraging presentment of our shipbuilding industry. In every case, however, there are special circumstances which have brought about the embarrassment of the particular company to which reference has been made. The most important failure was of course that of the United States Shipbuilding Company. The facts in this case are so well known to our readers that it is unnecessary to dwell upon them, and reference to that company can be dismissed with the mere statement that it was an instance of flagrant overcapitalization and excessive greed of promoters. It was not due to lack of business in the shipbuilding line, nor was it due to badly equipped plants or wrong methods of works management. In most of the other failures or reorganizations too much was attempted for the available capital. As to the two failures in the vicinity of New York, the main cause was too much interference by labor unions.

While the shipbuilding industry in this country has not yet taken rank with the industry as developed in the leading countries of Europe, this cannot be ascribed to lack of skill or enterprise on the part of our shipbuilders. Our marine designers have shown their ability in the construction of vessels intended for war purposes. In this line our designers and builders do not take an inferior place as compared with the builders of any other country. On the Great Lakes we have a number of shipyards which are well equipped, well managed, and which turn out a class of work showing continuous improvement in everything going to make a thoroughly finished and economically operated vessel. Our shipbuilders on the

seaboard would just as surely line up with their transatlantic competitors if they were favored with the same stimulating conditions in the ocean carrying trade as those which govern the lake trade. They are, however, compelled to confine their energies almost exclusively to vessels for the coasting trade or to repairs. The shipbuilding industry in the vicinity of our large seaports is of great importance, and even though our shipyards turn out few leviathans for the transoceanic trade, they employ thousands of men and consume great quantities of materials. Such interests are highly important from a domestic point of view.

It is unfortunate that these recent occurrences have cast discredit on the shipbuilding industry, as they may have a discouraging influence on those who would like to see this country occupying a higher position in the shipbuilding industry of the world. It is a popular belief that the next great development in the manufacturing interests of this country must be in connection with the extension of its ocean shipping. With this will come much greater growth in the shipbuilding industry. How this is to be brought about largely depends upon the course of legislation. The question is one which has been pressing for solution for a long time, but undoubtedly every day brings us nearer to the time when a solution will be found by Congress which will be of advantage to the trade and the country. It is too important a matter to be forever relegated to the background.

The Chicago Street Railway Strike.

The collapse of the street railway strike in Chicago is, for organized labor, an instructive object lesson. That it was untimely was an accident. This strike was carefully planned, and the preliminaries were carefully looked after. More than any strike of recent years, it was expected to excite public sympathy and command the support of public approval. For many reasons the street car companies of Chicago are unpopular. Their position is one of great uncertainty, and opinion is divided as to whether they are operating with or without franchise privileges. The service they have given for some years past has been pronounced unsatisfactory. They have no assured tenure of the right to operate their lines beyond the present year, and have devoted their energies to earning as much and spending as little as possible. There has been a strong public sentiment in favor of the municipal ownership and operation of all public utilities in Chicago, and the referendum recorded public opinion as in favor of municipal trading on a large scale. The public was assumed to be ready to believe any tales of wrong or hardship the men might tell, and to approve any reasonable issues selected as the basis of a general strike. Whether it was or not is, perhaps, still indeterminate. That it failed to give the strike any moral support, and that it approved cordially the measures of Mayor Harrison to keep it within reasonable bounds and suppress lawlessness, is evident, but there is room for doubt as to whether, if the strikers and their sympathizers could have made the fight on issues involving the interests of the street car employees without recourse to violence, public opinion would not have been with the men and against the companies, on general principles.

The strike was settled on terms very closely resembling unconditional surrender on the part of the men. They not only gained nothing, but some of the advantages they enjoyed prior to the strike were put in jeopardy. Those who had recourse to lawless acts lose their jobs by the concurrent agreement of both parties to the set-

tlement. That the others come back is quite as much a matter of convenience to the company as of advantage to the men. It would take a long time to break in a green force, and some experienced men are needed. It is quite within the truth to say that such a settlement could not have been exacted two years ago by the strongest railroad corporation in the United States. Then public opinion regarded very differently from now the systematic effort of organized labor to wring advantage from employers, even at the cost of their ruin. From much which has happened meanwhile we have learned to distrust the disinterestedness of strike organizers and to submit to very close and critical scrutiny the statement of grievances which serves as a declaration of war when a strike is decided upon.

Of the issues of the Chicago strike, one of the most important was that which for some time to come is likely to be paramount in all labor troubles—the closed shop. On this subject public opinion has shaped itself. It does not and will not approve of any agreement on the part of employers to close their doors against workmen who prefer independence to affiliation with the unions. It may be that in some trades organization has been carried to a point which leaves the employer no choice, since the unions have a monopoly of skilled and desirable labor. This advantage, however, is a transient one, and they are likely to lose it before the end of 1904. Between accepting a condition which cannot be escaped, and formally ratifying it by agreement, the difference is very marked. This explains why so few employers, even of those who are able to employ only union labor for the reason that none other is available, are reluctant, even when promised important advantages, to bind themselves under the agreement of the closed shop. Henceforth strikes brought to compel the surrender of the right of the open shop will lack the moral support of public sympathy. Very few of the unions have developed the conservatism which would warrant trusting them to the extent of excluding from employment all who are not their members. They will need a much wiser and more intelligent leadership than they now have before such contracts can safely be made, and with this they can, perhaps, make the advantages of membership so conspicuous that no desirable mechanic will be willing to do without it.

But the most important lesson of the Chicago strike is, undoubtedly, the evidence it furnishes that hereafter strikes must be conducted within the law. There is reason to believe that the Chicago gripmen and conductors expected to gain their purpose by creating a reign of terror, as was done in St. Louis, Waterbury and a number of other cities. The preparations were made to begin by obstructing the tracks, and, if this was not enough, to kill or maim the men working cars in place of the strikers, and to destroy property to an extent which would have rendered the operating of the lines impossible. For crimes of this character the union would have disclaimed all responsibility. Indeed, it might have "deprecated" all forms of lawlessness, and made great professions of displeasure when superservicable friends compromised the law abiding and amiable strikers by wrong doing. This, however, would have deceived nobody. As soon as it was recognized by the strike leaders that crimes against life and property would not be tolerated they saw that all hope of winning the strike was at an end. Unskilled labor cannot work successfully along union lines for the attainment of its ends by peaceful means. Its right to strike is unquestioned, but its right to take measures to destroy or incapacitate those who are ready by thousands to take the places thus made vacant is not conceded, and

when public opinion is arrayed in favor of compelling recognition of the supremacy of law, strikes in industries of a semipublic character, which cannot be made successful by any other means than the flagrant violation of law, are foredoomed to failure. In this respect the street car strike fiasco in Chicago is instructive, and its lesson should be heeded by the leaders of unskilled labor.

The latest advices indicate that the great steel pool on which the German producers of steel have been working is meeting with a good many obstacles. Started by the Rhenish Westphalian group, to which the large steel makers of the Sagar district and Lorraine have been joined, there is in evidence the usual strenuous tugging and manœuvering over participation and percentages. There is a suspicion even that some concerns are bluffing, with projects of extensions and additions to plant, and that some who were at first favorable have withdrawn at a critical moment, possibly in order to be able to revise their estimates of what they are entitled to. As yet no serious negotiations have been opened with the great Silesian group, whose strength lies in the control of a goodly share of the markets of Eastern Germany. But it is hinted that after the great makers of the West get together into one unit, that aggregation may be able to exert almost irresistible persuasion. Human nature seems to work along the same lines on both sides of the Atlantic.

The falling off of business in the metal lines is bringing home to the workmen the distinct benefit of the labor bureaus which have been established in several of the larger cities, generally by metal trades associations. Men are flocking to every such bureau to enroll themselves and at the same time apply for a position, and in many instances the bureaus have been able to find places for the applicants, where otherwise there would very likely have been long and perhaps futile search for work. Where a workman is laid off by a concern that is a subscriber to a labor bureau it is the concern's duty to notify the bureau of the fact. But many concerns are not yet subscribers and their employees must enroll themselves, the bureau taking them, of course, without regard to the fact that their former employers are not subscribers. The many instances of men getting work through the labor bureau are naturally given wide circulation among workmen generally. All this must have a strong tendency to establish among the workmen the fact that the labor bureau is an institution intended as much for their good as for that of the employer. Employers are becoming impressed with the usefulness of the labor bureau, looking upon it as a business investment, which is shown in the projects now on foot for the establishment of bureaus in various parts of the country. That at Boston will have a very wide scope. Another projected bureau is at Springfield, Mass., where a metal trades association is forming with this end in view.

The Pennsylvania-Webster Merger.—PITTSBURGH, PA., December 2, 1903.—The merger of the Pennsylvania Coal & Coke Company and the Webster Coal & Coke Company, Pittsburgh, interests has been completed. The capitalization of the former company has been increased from \$2,000,000 to \$12,000,000, and the bonded indebtedness from \$1,200,000 to \$12,000,000. Of the increase of the capitalization, \$5,000,000 is preferred stock. The mortgage guaranteeing the bonds covers all the property of the two companies. Of the bonds \$1,500,000 will be used to retire the preferred stock of the Webster Company.

Labor Notes.

The miners of the Lehigh Valley Coal Company, who have been on strike for seven months, the longest strike on record in the Central Pennsylvania coal fields, resumed work at the old wages on November 30.

Nearly two-thirds of the 2000 miners of the Northern Colorado coal fields resumed work on November 30, and it is expected that within a week or two the full force will be at work.

The United States Supreme Court on November 30 affirmed the validity of the Kansas law, which limits to eight hours a day's labor on contracts for public work of that State or of municipalities within it.

The labor difficulty at the works of the H. B. Smith Company, at Westfield, Mass., mentioned in *The Iron Age* some weeks ago, has been entirely adjusted. Twenty-five or 30 of the men who went out are at work, and the company are not now looking for more workmen. The company are at the present time running their works ten hours a day, as they have been in the past.

The McKeesport Tin Plate Company, McKeesport, Pa., have notified their employees of a reduction in wages. Some of the men have refused to accept the proposed reduction, and as a result the plant is only partly in operation.

The Independent Sheet Manufacturers' Association.

(By Telegraph.)

PITTSBURGH, PA., December 2, 1903.—A meeting of the Independent Sheet Manufacturers' Association, embracing the independent sheet mills in the Central West, was held in the Hotel Lincoln on Tuesday, December 1. The meeting was very well attended, and James A. Campbell of the Youngstown Iron Sheet & Tube Company, Youngstown, Ohio, presided. The principal matters for discussion before the meeting were the removal of the limit of output in independent sheet mills, and also the heavy reduction in wages of sheet mill workers recently made by the leading interest. For some time the independent sheet mills have been insisting with the Amalgamated Association that the limit of output be removed in order to place them on a competitive basis with non-union sheet mills, which have no limit of output. Some time ago the Amalgamated Association refused this request, but it was taken up again and a meeting of the sheet mill workers connected with the Amalgamated Association is to be held in Pittsburgh on Tuesday, December 8, when it is expected it will be decided to remove limit of output in union sheet mills. The matter of reduction in wages in non-union sheet mills was very thoroughly gone into, and it was decided to ask the Amalgamated Association to take this matter up at the meeting on December 8. Wages of sheet mill workers in all non-union sheet mills in the Central West have been reduced 20 per cent., but as the wages of roughers and catchers are not reduced, but borne by the roller, the average reduction to the roller amounts to about 30 per cent. The independent sheet mills insist that they must have the same scale of wages existing in non-union sheet mills, in order to compete in the open market. As to what will be done with their request for the same scale of wages remains to be seen, but it is probable that the union sheet mills will insist upon being granted the same concessions in wages that are now in effect in sheet mills that do not sign the Amalgamated scale.

Harry C. Lydon, vice-president of the Chicago & Great Lakes Dredge & Dock Company, Chicago, died recently of heart disease. Mr. Lydon was 32 years old and unmarried.

The Money Value of Technical Training.*

BY JAMES M. DODGE, PHILADELPHIA, PA.

President's Address, 1903.

Technical training may be self acquired or obtained through instruction. The ability to drive a nail properly, or to design and construct the most complex and wonderful of structures or devices, is the result of technical training in but different degree. Up to a very recent date, and within the memory of most of us, the apprentice system and that of independent delving represented the sole methods of acquiring training. Research and investigation carried on in individual lines, with varying degrees of success, dependent upon the mental make up of the individual, were the means of attaining theoretical technical knowledge. The blending of these two methods developed the earlier mechanical engineers and will, even in the future, enable those sufficiently gifted by nature and habit to attain eminence. The progress of the world, however, calls for a better and more speedy means of producing trained men than could ever be developed by the methods of self instruction. The individual striving for manual skill attains his desire under the old apprentice system. Individuals sufficiently gifted arise above their fellows, and become the leaders in their calling. The gratification of a mechanical appetite and the desire to earn more money than his fellows are two moving causes which impel a man toward technical education. A generation or so ago the universal belief was that the sooner a young man entered upon his apprenticeship, or began practical manual work, the better and more rapid would be his progress in the mechanic arts, and book learning was derided as being purely theoretical and of little practical value. This belief is, even at this date, all too prevalent, largely due to inherited error and to lack of knowledge and reliable data.

Obtaining data from which incontrovertible conclusions can be drawn is now comparatively easy, but a few years ago was practically impossible. We are all prone to take extreme cases of success or failure as the basis of our opinions, and lose sight of the fact that it is the average man whose career shows the true force and direction of the current. For convenience of comparison I will outline the actual progress made by four groups of men working in the mechanic arts—the unskilled labor group, the shop trained or apprentice group, the trade school group, and give the results attained. Each group I will refer to as an individual:

The Laborer.

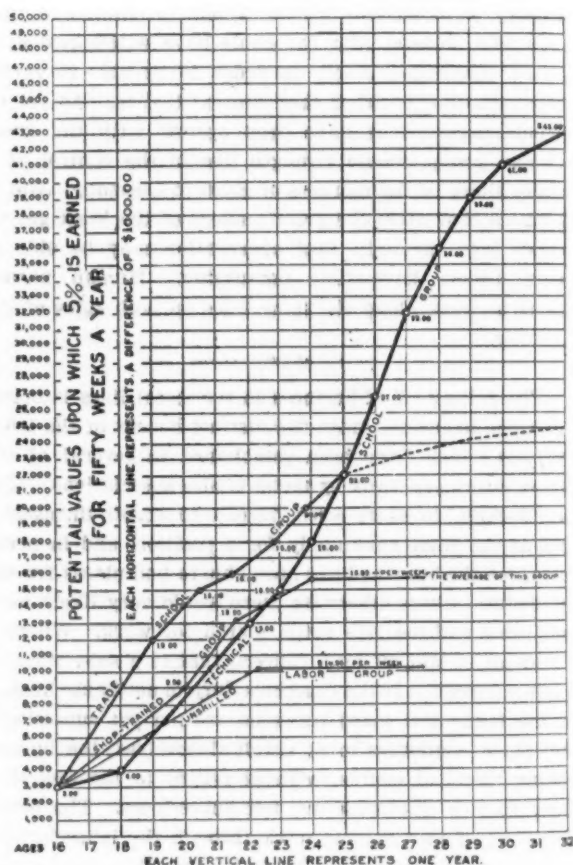
The first, the laborer, with but primitive and rudimentary training, working under the immediate and constant supervision of a boss and earning, as the line on the chart indicates, \$10.20 per week at the age of 22, his line remaining horizontal through the period of his usefulness. Data are lacking as to his progress before he reaches the age of 22.

The Apprentice.

The second, the apprentice, or representative of the shop trained group, of good health and habits, entering a machine shop at the age of 16 and earning an average wage of \$3 per week for 50 weeks per year, which is about the number actually worked, is \$150, or 5 per cent. on \$3000. This, then, is his potential or invested value, upon which he draws his interest on pay days.

On the chart accompanying this paper you will find, ruled horizontally, lines representing amounts increasing from the lower line upward by \$1000 each; starting at \$1000 and terminating at the top at \$50,000, these representing potential values, upon which 5 per cent. is earned for 50 weeks a year. The vertical lines each represent one year in time, beginning at the lower left hand corner at 16, and progressing in regular order until, at the lower right hand corner, we have 32, representing in all a lapse of 16 years. To illustrate the progress of the four groups graphically, we indicate on the line representing 16 years of age, and opposite the figure \$3000, the young

man just entering his apprenticeship. We will consider him typical of the shop trained group. Following the line to the right we see his average progress in earning capacity through the ensuing years, noting that at the age of 20 he is earning \$9 per week, which is 5 per cent. on \$3000, he having increased his potential or invested value in four years by \$6000. We now note that his accumulated experience enables him to make more rapid progress for the next year and a half, and from the age of 20 to 21½ years we find that his pay has increased to \$13.20 per week, and his potential value to \$13,200. He is now approaching his goal, and his line of progress does not continue at the same angle that it followed for the past few years, but deflects toward the horizontal; and at the age of 24 we find him earning \$15.80 per week, and his potential value \$15,800. In other words, in eight years he has increased his potential value \$12,800. Observation show that 5 per cent. of the apprentices ac-



quiring the machinist trade rise above the line made by our average man; 35 per cent. follow the line closely, and that during the period of training 20 per cent. leave of their own accord, and as near as can be ascertained go to other shops and continue in the line originally selected; 40 per cent., however, are found unworthy or incompetent, and are dismissed, probably never rising to the \$15.80 line. Apprenticeship of to-day in many establishments does not make the man, broadly speaking, a mechanic—in a majority of cases he is a specialist or tool hand, and not comparable with the old mechanic, who was a worker in metals, had some practical knowledge of steam and prime movers, could chip, file, work on lathe, planer, drill press or as an assembler, and was competent to meet the varied and unusual conditions found in general construction and repair work.

The Trade School Graduate.

The third group of young men are those fortunate enough to have had the opportunity of entering a trade school, which they do at 16 years of age, devoting the next three years of their lives—or until they are 19 years of age—to acquiring a trade under competent instruction, and at the same time adding to their store of rudimentary theoretical education. At the age of 19 a trades school man enters the machine shop, and can command

* Presented at the New York meeting (December, 1903) of the American Society of Mechanical Engineers.

\$12 per week, equal to the apprentice at 21 years of age, and very quickly makes his employment profitable to his employer. The three years in school have increased his potential value from \$3000 to \$12,000, a gain of \$9000. Thus he has caught up with the apprentice entering the shop at 16, and who has been working for five years. Progress of the trades' school group now follows a line which diverges from that of the regular apprentice, and by the time \$15.80 is earned by the regular apprentice, the trades' school graduate is earning \$20, with a potential value of \$20,000, or \$4200 greater than that of the shop trained man. The trades' school line continues at substantially the same angle up to an earning capacity of \$22 per week, and a potential value of \$22,000. Data are lacking as to the further progress, but the presumption is that this line will bear off more toward the horizontal, eventually paralleling the line of the shop trained man, but much higher on the chart.

The Technical Graduate.

The fourth group we will represent again by a boy of 16 studying at school until his eighteenth year, and preparing himself for admission to one of our higher institutions of technical learning, such as the Stevens Institute, the Massachusetts Institute of Technology, Columbia, Cornell and the like, where, after a four years' course, or at the age of 22, he is ready to begin practical work. The statistics upon which this chart is based show the average starting wage at \$13 per week, or the same amount earned by the regular apprentice at the age of 21½, and by the trades' school graduate at the age of 19½. In other words, apparently a graduate of our technical schools has lost by his six years of preparatory study, having been beaten by the regular apprentice by six months and by the trades' school graduate by 2½ years. From this time, however, there develops a most interesting and instructive line of progress. The regular apprentice, who is earning \$13.50 a week at the time the technical graduate is earning \$13, is overtaken in six months, and we find both earning \$14 per week, and the technical graduate reaches the \$15.80 line nearly one year before the regular apprentice. In other words, while it has taken the regular apprentice from his twenty-first to his twenty-fourth year, or three years, to increase his wages from \$11.50 to \$15.80 a week, the technical graduate has done the same in 15 months. Progress now continues on substantially the same line, and we find the technical graduate earning \$22 per week and crossing the line of the trades' school group in three years' time, a worthy tribute to the higher education and attainment. The line of the technical graduate now continues divergent from that of the trades' school graduate, with earning capacity regularly increasing, and a corresponding augmentation of potential or invested value, until, at the age of 32, or ten years after entering upon the practical work, we find our technical graduate earning \$43 per week, and his potential value at \$43,000. In other words, six years of preparation have enabled him to distance the shop trained man and the trades' school graduate overwhelmingly. Bearing in mind that this is an average line, it is of interest to say that most technical graduates with a better record than the one in the chart have devoted even more time to their preparation, either by study or by shop work, after graduation. Those, on the other hand, who have not come up to this average line represent, in the main, men more or less incapable of original work. The reason that higher education, other things being equal, carries with it the ability to earn high wages is that, consciously or unconsciously, these men are directing and making it possible for large numbers of laborers, shop trained men and trades' school graduates to perform useful work. A draftsman at his board may never realize that as a result of his drawing 100 men or more may be given employment. His design calling for structural steel, for instance, could not be built were it not for the labor of many men employed making and rolling the steel before it reaches the shop. Then come the shop men, who cut, punch and shear; and then the erectors, who assemble the structure in accordance with the original plan. For this ability and knowledge our technical man is paid.

It is quite obvious that all workers in the mechanic arts cannot be technical graduates. Some must, through natural limitations or lack of opportunity, follow the apprentice line, and others the trade school. It is from graduates of the latter that leading shop men and foremen are largely selected. These two classes, supplemented by the technical graduate, constitute the vast army of workers in the mechanic arts. Thus we see clearly that preparation pays, and that it pays in dollars and cents, and that even a long term of years spent in proper study and technical training is a good investment from every point of view. Of course, apprentices have made and will make, in rare instances, a better showing than the average technical man of the chart, and many of our greatest men have, by sheer force of character, excellence of brain fiber, persistence and self-education, risen to pre-eminent positions independent of all regular systems. To the end of time great examples of this kind will be found. Among those whose names readily come to mind are the elder Krupp, Joseph Whitworth, George M. Pullman, Andrew Carnegie, John Fritz, Prof. John E. Sweet, Edwin Reynolds, George H. Babcock and Coleman Sellers. The same is true of the trades' school graduate, but, as said before, we are dealing with the average of each class, taken from actual statistics, with an earnest desire to ascertain the facts, and without any preconceived notion of the outcome.

It may be stated as a truism that every man pays for the amount or percentage of bossing he requires, and conversely, every man's wages increase in proportion to his ability to act as the boss or foreman of himself and others. The lower the wage rate the greater the amount of watching and directing constantly required. The slaves of ancient Egypt received no wages, but were treated as horses are to-day. They were fed and sheltered according to the ideas of their owners. No slave worked voluntarily, and the foreman's or leader's excellence was gauged entirely by his physical strength and efficiency as a driver. This was certainly the zero of labor conditions.

The highest wages are paid to the man through whose ability the largest number of other men may be most profitably employed. He does his work with his brain. Thus, on the one hand, we see manual labor receiving no wages, and on the other mental labor reaping the highest reward. Between these two extremes is found every condition of human life.

A practical man performs his work within the radius of his arm, a technical man within the radius of his brain. This fact is, even to-day, realized by the few, but it is gratifying to know that the number is increasing.

The technical training of an individual makes him valuable just in proportion as his ability is manifested by good judgment and perception. Trained common sense receives the highest compensation and reaps the greatest reward. Mental ability to receive ideas and impart them properly and wisely, rearranged and grouped, is typical of the most brilliant mentality; a dull intellect may be compared to blotting paper, fit only to absorb and inter a heterogeneous mass of impressions.

The most interesting of all graphical charts would be that properly exploiting the value of technical training to manufacturing plants and enterprises. To illustrate this more clearly we may fairly assume that the apprentice of our chart corresponds to the old fashioned primitive shop, having practically no overhead expense, the proprietor carrying the business "in his hat," priding himself on his nonreceptive sturdiness, contempt for improvements and personal attention to all details. For his costs he adds together the value of raw materials and labor and then adds a few dollars for profit. The line of this establishment would parallel the \$15.80 line of our shop trained group.

The trades' school line on the chart truthfully represents establishments in which some attention has been paid to the improvement of system, with an increased so-called nonproductive force, operating possibly in some particulars with brilliancy, but with defective features in others; acknowledging the value of improvement if internally originated; moderately but unconsciously absorbent of ideas from without, but tenacious of dogma and

lacking departmental symmetry. Growth, increased earnings and relative immunity from disastrous failure result.

The technical graduate line of our chart represents the manufacturing establishment technically trained and "abreast of the times" in all particulars, and I predict a time not very far distant when it will be almost universally recognized that establishments should be trained as well as individuals, and that the marvelous development in scientific shop practice and management will do for the manufacturer fully as much as technical training is doing for the individual.

A change of mental attitude toward the subject of advanced shop practice and management is noticeable to a marked degree. Within a very few years indifference and antagonism have changed to a growing interest and appreciation.

The greatest musical composition contains no new notes; each note of the scale can be sounded on a penny whistle. Our greatest composers have only arranged the notes in harmonious sequence. The artists that can render their music truly, well deserve unstinted praise, even though they lay no claim to the composition of the masterpiece. Truly a listener at the grand opera could say, "There is nothing novel in this; I have heard every one of these notes before. I have even made similar sounds myself, and the result was far from satisfactory." So with shop management; it must be as fundamentally harmonious as a musical composition, and need not of necessity embody within it any one element of extreme originality. Of it the individual may truly say, "Nothing novel has been presented; I tried this feature or that feature with no beneficial result," but if he can play the music of the art of management thoroughly well he need not grieve because he is not its composer.

Henry R. Towne, F. A. Halsey, H. L. Gantt and Charles Day have all ably contributed through our proceedings to the literature of this most important subject. Fred. W. Taylor, in his paper of the current year, while claiming no originality of detail, has presented to the world the most complete and thoroughly scientific system of shop management ever promulgated. As an investigator and student he is sowing seeds in the field of the mechanic arts which will bear a bounteous harvest.

It may be truly said that this society, and others allied in promoting the mechanic arts, complete the system of technical training by going beyond the province of the technical schools, their students being the men who constitute the management of our manufacturing enterprises. It should be gratifying to all of us that the pioneer literature of advanced shop management and practice for this post-graduate course of technical training was presented to the world by the American Society of Mechanical Engineers.

An Absurd Report.

(By Telegraph.)

PITTSBURGH, Pa., December 2, 1903.—In Pittsburgh papers recently have appeared statements to the effect that George G. McMurtry, who is to retire shortly as president of the American Sheet Steel Company, together with Veryl Preston, who recently resigned as one of the vice-presidents of the United States Steel Corporation, had acquired the site and buildings formerly occupied by the old Apollo Iron & Steel Company, at Apollo, Pa., and would erect thereon very large independent sheet mills. The absurdity of this report is shown by the fact that the property of the old Apollo Iron & Steel Company was originally owned by the American Tin Plate Company, but later was transferred to the American Sheet Steel Company and is now owned by that concern, and in reality by the United States Steel Corporation. Mr. McMurtry is leaving the American Sheet Steel Company with the very kindest feelings on both sides, and for this, and other causes dating back to the transfer of the Apollo Iron & Steel Company to the American Sheet Steel Company, he does not propose to engage in the sheet business in Apollo or any other place.

The next meeting of the steel billet pool is to be held on December 16.

The Mechanical Engineers.

The first session of the forty-eighth meeting of the American Society of Mechanical Engineers was called to order at 9 p.m. on Tuesday evening in the society house, 12 West Thirty-first street, New York. The first business was the appointment of tellers on the election of members, election of officers and revision of rules. The address of President James M. Dodge on "The Money Value of Technical Training" was then delivered. He was asked the basis of the data used in the diagram shown, and stated that it comprised the records of employees of the Link Belt Engineering Company. Of these 80 were technically educated, 24 had been instructed in trade schools and several were apprentices and laborers. He said the best technical men are those who go into practical work after graduating and then spend some time as instructors. In practical work they then prove best.

Wednesday Morning Session.

This session was held in Mendelssohn Hall and was called to order at 10.30. The report of the Council was presented.

C. W. Hunt made a report on the present state of the proposed Carnegie Building. He said that the land had been bought and the several societies are proceeding as rapidly as possible toward the acceptance of the offer. Mr. Carnegie is ready to increase the amount of his offer as necessary, being very much interested in the project, and its success will be a source of great gratification to him.

The tellers reported the election of 58 members, 15 associate members and 46 juniors, making a total increase of 119. They also reported the revision of rules adopted by 437 to 5, finding six ballots defective. They further reported the following officers elected:

President, Ambrose Swasey, Cleveland, Ohio; vice-presidents, Prof. D. S. Jacobus, Hoboken, N. J.; M. L. Holman, St. Louis, Mo.; W. J. Keep, Detroit, Mich.; managers, George I. Rockwood, Worcester, Mass.; J. W. Lieb, Jr., New York City; Asa M. Mattice, Pittsburgh, Pa.; treasurer, William H. Wiley, New York City, re-elected.

Prof. John L. Sweet escorted President Swasey to the chair, and introduced him to the society. Mr. Swasey made a short speech of thanks for the honor conferred, closing by referring to Professor Sweet's visit to him at Hartford years ago, telling him of the proposed founding of the society which he believed would become nationally important. He was glad that Professor Sweet had been spared to see the realization of his hopes and predictions.

The report of the Committee on Standard Specifications for Boiler Plate, Steel Castings, &c., was read by Professor Spangler. Various written discussions were presented, some favoring and others opposing the dropping of requirements for determination of yield point. Protests were made against bringing such different materials as boiler plate and steel castings under one specification, the claim being advanced that the result is confusing and causes unavoidable ambiguity.

James Christie moved that the report be referred to Committee No. 1 of the American Association for Testing Materials, for its use in preparing its final report to present at the international meeting at St. Petersburg in 1904, when attempts will be made to formulate universal specifications if such be possible. The motion was carried.

Prof. G. Lanza urged the necessity for recognizing the importance of tests to show endurance of repeated stresses.

Professor Carpenter advised the retention of yield point determination as tending to promote care and accuracy of testing, forcing slower testing, &c.

H. H. Supplee moved the appointment of a committee to look up the history of the society and prepare its records, as well as of the society's relics, portraits, library, &c. This motion was carried.

The reading of papers was then taken up.

The Manufacturers Light & Heat Company of Pittsburgh, suppliers of natural gas, have completed the building of a 20-inch line to the Pittsburgh district, and are now supplying gas through it.

Iron and Steel in Scotland.

GLASGOW, November 19, 1903.—In this city we are having just now a practical demonstration in rail welding by the electric process of the Lorain Steel Company of Lorain, Ohio. The company have entered into a contract to weld a minimum of some 2000 joints, and as many more as may be hereafter decided on, for Glasgow's municipal tramway system. The company sent over their own plant and mounted it on special cars built here to fit our track, and they also sent over their own men to carry out the work. The electric power is obtained from the trolley wires of the tramway system and is supplied gratis. If the experiments now being conducted prove satisfactory it is possible that the whole Glasgow system of 60 to 70 miles will be electrically welded. When they are finished here the Lorain Steel Company have to do some welding in one or two of the English towns. But Glasgow is the first city in Europe, I believe, to adopt this American electric welding process, and the contract is exciting great interest.

The Pig Iron Trade.

It is remarkable how our stocks of pig iron continue to dwindle week by week, in spite of the evidences of declining trade and increased competition from your side. There are few transactions in warrants in the iron ring, but it looks as if there would soon be no iron left to play with for the rise or fall. The bears, of course, have been incited to action by the reports of American sales, actual or imaginary, and they succeed in battering down prices from 3 to 6 pence per ton now and again. But the losses are soon made up, for the bulls are quite complacent when they look at the state of the warrant stocks and see the continued flow of shipments. All the transactions in warrants nowadays are between members of the ring, and are regarded with only a mild interest by both producers and consumers. The latter, however, are made chary buyers by the reports of American sales both in this country and on the Continent. The quantity of American pig iron actually placed in England (none has yet come to Scotland) is not very large, in spite of all the talk. But such as it is, it is regarded as but the beginning of the ebb tide, and consumers ask what is the use of buying more pig iron than is actually needed from day to day, when next week or the week after one may be besought to buy at several shillings per ton less money? The belief, in short, is that you will have a very large quantity of iron to market within the next few months, and that the most of it will be dumped on us.

It is curious, too, how well quotations for makers' iron are sustained, though it is not certain that these prices are always paid. The current prices of makers' iron are:

No. 1.	No. 1.
G. M. B., f.a.s. Glasgow.50	Shotts, f.a.s. Glasgow...64
Monkland, f.a.s. Glasgow.51 6	Clyde, f.a.s. Glasgow....60
Coltness, f.a.s. Glasgow..72 6	Carnbroe, f.a.s. Glasgow.54
Summerlee, f.a.s. Glasgow.63	Glengarnock, f.a.s. Ar-
Calder, f.a.s. Glasgow...60 6	drossan .....59 6
Gartsherrie, f.a.s. Glas-	Eglington, f.a.s. Ardrossan.53 6
gow .....60 6	Dalmellington, f.a.s. Ayr.53 6
Middlesbro G. M. B., f.o.b. Tees: No. 1, 44 shillings; No. 3, 43 shillings. No. 4 foundry, 43 shillings; No. 4 forge, 42 shillings 9 pence.	
W. C. hematite, mixed numbers, 55 shillings 6 pence f.o.b. Cumberland or Barrow.	
E. C. hematite, mixed numbers, 52 shillings 6 pence per ton, f.o.b. Tees.	
Scotch hematite, mixed numbers, 57 shillings 6 pence, f.o.t. steel works.	

The total public stock of pig iron in the United Kingdom is now the smallest since 1900, being under 124,000 tons. Cleveland is now under 100,000 tons and Scotland under 10,000 tons.

The Middlesbrough market is quiet in tone, and there is not a great deal doing. Quotations for Cleveland pig are pretty stationary. No. 1 is cheap as compared with other qualities, the make being large owing to the furnaces working exceptionally well. Manufactured iron and steel prices are easier, and this week steel ship plates are reduced to £5 10s. and angles to £5.

Iron and Industrial Stocks.

The tendency in the iron and steel stocks has steadily been in the direction of improvement during the past week. Even the passing of the dividend on the preferred stock of the Republic Iron & Steel Company had no unfavorable effect as it had been discounted in the decline in the price of that stock in the previous week. A prominent influence in advancing prices was the punishment inflicted on those who had rashly sold industrial stocks which they did not own, in the belief that they would be able to buy them in at much lower prices. They found that the supply of these stocks was limited, and were forced to cover their short sales at considerable loss. Locomotive preferred advanced during the week to 76½. Railway Steel Spring preferred advanced to 73. They had been attacked by short sales. The passing of the dividend on the Republic preferred caused that stock to decline from 41 to 38, subsequently recovering to 40. The range of prices up to Tuesday night of this week was 10½ to 11½ on Steel common, 51¼ to 52½ on Steel preferred, and 68¼ to 69½ on the new 5's. The last sales up to 1.30 p.m. on Wednesday were as follows: Can common 3¼, preferred 30½; Car & Foundry common 18¼, preferred 65¼; Locomotive common 15, preferred 76½; Colorado 25½; Pressed Steel Common 24½, preferred 65½; Railway Steel Spring common 17, preferred 73; Republic common 6½, preferred 39½; Sloss-Sheffield common 24, preferred 68; Tennessee 29½; United States Steel common 11½, preferred 52½, new 5's 68¼.

Additions to the Lackawanna Plant.—The Lackawanna Steel Company, Buffalo, N. Y., have placed with the Morgan Construction Company, Worcester, Mass., not only the contract for a merchant bar mill, mentioned in a recent issue, but also an order for a gas plant to include 16 Morgan continuous gas producers, equipped with George automatic coal feeds. These producers will furnish gas for the steel company's No. 32 slabbing mill and 48-inch universal plate mill. The buildings for both installations have been ordered by Morgan Construction Company of McClintic-Marshall Construction Company, Pittsburgh.

The Pittsburgh Steel Company.—PITTSBURGH, PA., December 2, 1903.—The large rod, wire, wire nail and fencing mills of the Pittsburgh Steel Company at Monessen, Pa., which have been running only partly full for some time, have been started up to practically full capacity in all departments. This company are having a very heavy demand for their electrically welded fencing and are shipping it to every State in the Union. They are also operating a large factory in Canada to supply the Canadian trade.

William H. McCord, vice-president of the American Bridge Company, has tendered his resignation to that company and will become the president of a new corporation, to be known as Post & McCord, Incorporated, which company will engage in the business of engineering and contracting for structural and ornamental iron work for buildings. Associated with Mr. McCord in the new company are the following: William C. Post, formerly contracting manager for the American Bridge Company of New York in the metropolitan district, who will become vice-president and treasurer; Andrew J. Post, formerly chief engineer of the Brooklyn plant of the Empire Bridge Company, who will become secretary and chief engineer; John C. McCord, formerly erection superintendent for the American Bridge Company of New York in the metropolitan district, who will take charge of the erection forces, and Robert C. Post, formerly contracting agent for the American Bridge Company of New York, who will occupy a similar position in the new company. Temporary offices will be located in the Fuller Building, known as the Flat Iron Building, New York City.

Thomas L. Luders, Sr., one of the founders of the Phosphor-Bronze Smelting Company, Limited, of Philadelphia, and for nearly 30 years treasurer of the company, died in Philadelphia, November 23, in the eighty-second year of his age. He was at one time president of the Frankford & Southwark Street Railway, and associated with his brother-in-law, the late Joseph Harrison, Jr., in the development and production of the Harrison safety boiler.

MANUFACTURING.

Iron and Steel.

The Carnegie Steel Company's Mahoning and Shenango Valley plants are now all connected by a special telephone system. They are also connected with the general offices in Pittsburgh, as well as with the plants at Homestead, Braddock and Duquesne. Much satisfaction is expressed in Sharon over the prospect of resumption at the North Sharon Works of the Carnegie Company by January 1. Repairs have been well advanced and the closed furnaces will be relined by that time. Much confidence is expressed in the future course of business around all the Shenango Valley plants of the United States Steel Corporation. The capacity of every active plant is being increased and many greatly needed repairs are being made. Office expenses are being reduced, it is true, but every indication points to the profitable operation of the plants in the future as in the past.

The steel plant at the Worcester Works of the American Steel & Wire Company shut down November 25 for several weeks. It is understood that for the time being the steel used in the Worcester mills will come from the company's Western plants.

The work of erecting a blast furnace on the Nova Scotia Steel Company's property at Sydney mines will be delayed on account of a fire on November 30, which destroyed the local offices and workshops of the Rarig Engineering Company.

The Bessemer rail mill, one of the blooming mills and two of the blast furnaces of the Pennsylvania Steel Company, at Steelton, Pa., were out of service last week. The furnaces are being repaired and will scarcely be ready for blast again this year.

Timmes & Hecht, proprietors of the spike and galvanized iron mill at Scranton, Pa., will enlarge their plant by the addition of a puddling mill and will purchase land on which to erect a portion of the new structure. Land will also be acquired for storage purposes and for future enlargements. The recent slump in the iron trade, which affected the operations and output of the bar and muck mills, has not caused any falling off in the demand for iron of the quality manufactured by the Scranton firm, and trade prospects are bright. The new mill will be ready for operation about the middle of next summer, it is expected.

The mills of the Reading Iron Company, Reading, Pa., which have not been operated for several weeks, have resumed work with fair orders ahead. The puddle mill of Samuel R. Seyfert & Bro., Reading, has also resumed operations with full force of hands.

The Carpenter Steel Company, Reading, Pa., resumed operations on Monday, November 29, after a shut down of several weeks, due to the appointment of a receiver for the company. The receiver has decided to operate the mills.

The tin mill of the La Lance-Grosjean Company, Harrisburg, Pa., has resumed operations after a shut down of one week on account of slack orders.

It is stated the Everett Furnace, at Everett, Pa., has closed down indefinitely.

The mills of the Kittanning Iron & Steel Company, Kittanning, Pa., were closed down last week. The company's furnace and the typewriter works at that place are also closed indefinitely.

The W. De Wees Wood works of the American Sheet Steel Company, at McKeesport, Pa., will likely start up this week to nearly full capacity. This plant has been extensively repaired in the past few months. The heaters and rollers have accepted a reduction of about 20 per cent. in wages, while other labor has also been reduced.

The Demmler works of the American Tin Plate Company, near McKeesport, Pa., which are idle at present, will be started in a short time. The men employed at this plant have agreed to accept a reduction of about 20 per cent. in wages, contingent upon the plant starting up.

This week the sheet mill, skelp mill and pipe mill of the Youngstown Iron Sheet & Tube Company, at Youngstown, Ohio, will be idle. The balance of the plant will continue in operation. During the shut down repairs will be made, stock taken and the entire works put in first-class shape. The Youngstown Iron Sheet & Tube Company have had a good demand right along for their puddled iron sheets and iron pipe, and expect to run their plant to full capacity as soon as it starts up again.

The annealing furnaces in the new plant of the Standard Tin Plate Company, at Canonsburg, Pa., are not quite ready to operate, but will be very shortly, at which time the company will be taking black plate right through to the tinning house. At the present time they are operating only two of their hot mills, because of not being able to take the product through to the finishing end. The plant of the Standard Tin Plate Company is a new and modern one and will probably be in full operation shortly after the first of the year. The officials are: E. J. Jeffries, president and general manager; J. V. H. Cook, treasurer, and C. C. Johnson, secretary.

The Oliver & Snyder Steel Company of Pittsburgh have added 80 new ovens to their new Oliver No. 3 coke plant, in the Connellsville region.

The Pennsylvania and Pittsburgh works of the American Tin Plate Company, at New Kensington, Pa., have been closed down in all departments. Only a few watchmen are now employed about the plants.

The Bessemer plant of the Republic Iron & Steel Company, at Youngstown, Ohio, which is now idle, is expected to start up within the next week.

The Independent Rolling Mill Company of Cuyahoga Falls, Ohio, have been incorporated with a capital of \$175,000. The new interest will operate the plant of the Ohio Iron & Steel Specialty Mfg. Company, at Cuyahoga Falls, which was recently sold. Wilkoff Brothers of Youngstown are large stockholders in the new concern.

Stacks Nos. 1 and 3 of the Carnegie Steel Company, at the Ohio works, Youngstown, Ohio, which have been banked for some time, started up on Tuesday, December 1. Stack No. 2 is still idle, but is ready for blast at any time, having recently been relined and repaired.

Struthers Furnace of the Struthers Furnace Company, at Struthers, Ohio, will blow out about December 10 for an indefinite period.

The Colorado Fuel & Iron Company's plant, at Pueblo, Col., has not entirely closed down, as was reported. The wire mill was closed Saturday, but two blast furnaces are in operation, and others will be blown in as soon as a supply of fuel can be secured.

General Machinery.

The foundry and machine business of Charles A. Gildemeyer is to be moved from Philadelphia to Minersville, Pa., where the citizens have subscribed \$5000 for the erection of suitable buildings. This winter a three-story machine shop, 75 x 90 feet, is to be erected, and in the spring a foundry of the same dimensions will be built. A brass foundry is also to be installed in connection with the machine shop. The buildings will be located on the Lehigh Valley and Philadelphia & Reading railroads.

At a recent meeting of the stockholders of Mt. Carmel Iron Works, Mt. Carmel, Pa., the capital stock was increased from \$20,000 to \$50,000 and the following officers were elected: Robert Muir, president; C. A. Gable, treasurer, and Thomas Sanger, secretary and manager. A quarterly dividend of 2 per cent. was declared, making a total of 25 per cent. for the year.

The Mining & Smelter Supply Company, Denver, Col., have secured a permit to do business in Texas, increasing their capital stock from \$50,000 to \$60,000 for that purpose.

Carse Bros. Company, Chicago, have just sold one of their fast first motion tramping plants, to go on to one of the large independent mines at Ironwood, Mich., and to convey ore of various grades to the stock piles. The plant is to be driven by a pair of engines to develop 55 horse-power with 150 pounds steam pressure, and of the slide valve type, direct connected to the drum shaft. The drum is of steel, 4 feet in diameter and 24 inches face, and is designed to carry by over winding 1600 feet of rope. This plant is to run with 125 pounds steam, and is to snap the cars out from under the skip and to run to the dump by gravity, pulling them back at the rate of 2500 feet a minute. The drum is run loose on the shaft and is equipped with an expansion band clutch shod with paper fiber and a contracting band brake shod with paper fiber, and will be mounted on the loading level of the head frame. We also understand that they are figuring on a large coal hoisting plant for Southern Tennessee, designed to hoist 26,000 pounds gross load from a depth of 280 feet at 300 feet a minute.

The Marshall & Huschart Machinery Company, Chicago, have incorporated in Ohio with a capital stock of \$20,000 in order to do business in that State. H. C. Elliott will act as the company's representative and will be located at 24 Lake street, Cleveland.

We are informed that there is no truth in the report that the Pennsylvania Railroad Company are to erect a roundhouse and repair shops at Kiskiminetus Junction.

The directors of the Landis Tool Company, Waynesboro, Pa., have declared an annual dividend of 6 per cent. A large sum was added to the company's growing surplus. The directors authorized the officials to decrease the working force if necessary.

The recently organized Champion Shoe Machinery Company, St. Louis, Mo., have installed a plant for the manufacture of wax thread sewing machines for boots, shoes and leather, and other shoe machinery. The officers are J. B. Dobyne, president and treasurer; G. I. Corcoran, vice-president, and G. A. Dobyne, secretary.

Drills, dies, saws, forges and 10 horse-power engine are required by the National Gate Company, Deansboro, N. Y., who will establish a plant for the manufacture of a self operating gate to be made of iron and wire. The company were recently incorporated with a capital stock of \$15,000, and the following are the officials: R. H. Hadcox, president; William F. Kimball, vice-president; A. D. Van Vechten, secretary and treasurer, and George S. Patrick, superintendent of construction.

Power Plant Equipment.

The Down Draft Boiler & Machine Company, St. Louis, Mo., were incorporated last week with \$25,000 capital stock, fully paid in. The incorporators are Max Judd, Wm. Koch, Theodore Hemmelmann, Jr., and Charles Brauner.

The Bloomington Electric Railway, Light & Heating Company, Bloomington, Ill., are adding 1000 horse-power to their condensing system. W. H. Schott, heating engineer and contractor, Chicago, is installing his type of condensers. Wm. Baragwanath & Sons, Chicago, are doing the shop work. The same contractor is adding to the heating system of the Illinois Hospital for the Insane at South Bartonville, near Peoria.

The Otto Gas Engine Works, Chicago and Philadelphia, have increased their capital stock to \$2,500,000. As a result of this increase in stock an enlargement of their plants will be undertaken and their output will be supplemented by units of larger capacity and a more complete line of the products now manufactured.

The Brennan Boiler Works Company, Battle Creek, Mich., are adding to their plant by the construction of a building, 45 x 150 feet and 35 feet high, which will be utilized for test, storage and boiler rooms.

Foundations have been started for the foundry building of the Burns Boiler & Mfg. Company, West De Pere, Wis. The new building will be 50 x 130 feet. The company will soon be in the market for necessary equipment.

The Hampton Electric Light & Power Company, Hampton, Iowa, have installed two 80 horse-power boilers this fall at their plant in addition to two 60 horse-power boilers already in. In addition to this work the company also built a 100-foot steel stack.

Work is fast nearing completion upon the new power plant of the R. F. Sturtevant Company, at Hyde Park, Mass. The plant will comprise four water tube boilers, with stokers supplied by Sturtevant forced draft, an economizer with Sturtevant induced draft, and a complete outfit of Sturtevant generating sets, together with condenser, air compressor, &c. The Sturtevant exhaust head is used for separating the water and oil from the exhaust steam.

The Hasbrouck Motor Works Company, West Mystic, Conn., have been incorporated under Connecticut laws with a capital stock of \$75,000. The incorporators are A. M. Stephen and Stephen E. Hasbrouck of West Mystic, William K. Holmes, Jr., of New York, and C. D. Holmes of Mystic. The company have new shops at West Mystic where they will manufacture motor engines.

The Westinghouse Electric & Mfg. Company of Pittsburgh have secured a contract for the equipment to be installed in the power station of the Metropolitan Railway Company, which company's system, operating between the heart of the city of London and the Northwest suburbs, is to be converted from steam to electricity. The initial capacity of the plant will be about 15,000 horse-power. There will be three turbines of 3300 kw. capacity each. The boilers will be of the Babcock & Wilcox type.

W. F. Holt, president, Holton Power Company, Holton, Cal., will receive bids until January 1 for a \$75,000 electric plant.

Charles B. Haskell, secretary, Routt County Electric Light & Power Company, Denver, Col., will receive bids until January 1 for the proposed \$60,000 electric light plant.

The boiler house at the plant of the Electric Light, Heat & Power Company, Delaware, Ohio, was badly damaged by fire last week. A portion of the plant has been kept in operation, but extensive repairs will be necessary to some of the boilers.

Fires.

The patterns and pattern shop of the Koken Iron Works, St. Louis, Mo., were destroyed by fire November 20, entailing a loss of over \$50,000. Arrangements for rebuilding are being made.

The Lighting Plant of the Hackensack Gas & Electric Light Company, Hackensack, N. J., was destroyed by fire November 27. The loss is placed at \$50,000. It is understood that the plant will be immediately rebuilt.

On November 28 fire did \$30,000 damage to the color works of J. S. & W. R. Eakins, Brooklyn, N. Y.

The new washer of the Northwestern Improvement Company, Roseman, Mont., was destroyed by fire November 28. The loss will reach \$75,000.

The plant of the National Biscuit Company, New Orleans, La., was destroyed by fire November 28. The loss is placed at \$200,000.

The large plant of the Summit Proofing Company, Hoboken, N. J., was destroyed by fire November 28. The loss is estimated at \$250,000. The company manufactured water proof cloth.

The Williams Stove Lining Company's plant, at Taunton, Mass., was destroyed by fire November 30, entailing a loss of about \$30,000.

The plant of the Martin Hardsocg Mine Drill & Tool Company, Allegheny, Pa., was damaged \$30,000 by fire November 27.

The shops of the Rarig Engineering Company, at Sydney, C. B., were destroyed by fire November 30.

The Hancock Leather Company's plant, Amherst, Maine, was destroyed by fire December 1. The loss is placed at \$100,000.

Bridges and Buildings.

The Warren County Commissioners have given the contract for a new jail at Warren, Pa., to the Van Dorn Iron Company, Cleveland, Ohio, at their bid of \$22,000.

The Bethlehem Bridge & Terminal Company, Bethlehem, Pa., Charles M. Dodson, chairman, will build a steel bridge over the river at that point.

Foundries.

Charles Herman & Son have recently completed the building of a foundry at Sharpsburg, near Pittsburgh, and are manufacturing the Herman pneumatic jarring molding machine, for which some strong points of superiority are claimed.

The J. E. Porter Company, Ottawa, Ill., are erecting a fire proof foundry building, 60 x 160 feet, which will be thoroughly equipped with electric power and other modern machinery. This foundry is to take the place of the one which was recently destroyed by fire.

The Helmick Foundry Machine Company, Fairmont, W. Va., whose plant was partly destroyed by fire early in October, announce the completion of their new foundry and smith shop. They have enlarged the foundry and installed modern equipment, and are now better prepared to take care of their trade.

The Niles Foundry & Specialty Company, Niles, Mich., recently incorporated, will occupy an existing plant. Charles T. White is manager.

Hardware.

The Kalamazoo Wagon Company, Kalamazoo, Mich., recently suffered loss by fire to the extent of \$8000. The fire, however, will in no way interfere with manufacturing operations.

The North Dakota Mfg. Company have organized with a capital stock of \$100,000 at Grand Forks, N. D., to manufacture wind stackers. The company expect to have a new factory building completed and in operation by the first of the year. The officers of the company are: President, John Henry; vice-president, John A. Henry; secretary-treasurer, James G. Henry.

The American Harrow Company, Detroit, Mich., have torn down an old one-story factory building and are erecting a two-story structure in its place, the dimensions being 42 x 650 feet. The company are also installing a new engine and making a number of other important changes.

The T. Swanson Mfg. Company, Shenandoah, Iowa, are erecting new buildings, including a one-story brick structure, 70 x 180 feet, which is nearly completed; a foundry, 40 x 50 feet, and a paint room, 40 x 60 feet. This company manufacture different kinds of cultivators for listed corn, wagon boxes, shoveling boards, water tanks and hay tools.

The Walter A. Zelnicker Supply Company, St. Louis, Mo., will erect a factory for the manufacture of hardware specialties, heavy hardware and repair engines and cars. A large warehouse will store the surplus stock which the company will manufacture. The company have also purchased 5 acres of land adjoining the new factory, upon which tracks are being laid from the Belt and Southern railroads.

The Sherwin-Williams Company, Cleveland, Ohio, will build an addition to their paint works at Kensington, Ill. It will be two stories, 40 x 164 feet, and will cost about \$15,000.

The Emmert Mfg. Company, Waynesboro, Pa., report a continued good demand for their Emmert patent universal vises. Their foreign trade also is increasing. They are having regular monthly orders from Great Britain, Germany and Australia, and have recently shipped 24 vises to South Africa for the British Government. They expect their new foundry to be finished and in operation by December 10.

Many entirely misleading reports are afoot as to the situation among the large hardware manufacturers of New Britain, Conn. Stories of large numbers of workmen being discharged are told with wonderful disregard for facts. Rumor discharges 500 or 1000 workmen at a time. The truth is, as careful inquiry among the New Britain manufacturers reveals, that business conditions are more nearly normal than they have been for some years past. The trouble has been that more business was received than could be handled to advantage, even with greatly increased manufacturing facilities. Extra men were put to work in the rush, in the attempt to keep up with orders, until the force at work was abnormal and consequently not economical. Orders have fallen off of late, not to an alarming extent, but, on the contrary, to a point where manufacture can be carried on with the maximum economy. As an official of one of the largest concerns of New Britain put it, conditions are now such as to promise greater financial profit than has been the case with the greater rush of orders. The men who have been laid off are as a rule those extra men whose engagement was never considered permanent and generally they are unskilled labor. The P & F Corbin Works, for instance, are running ten hours a day six days a week. The Russell & Erwin Works are continuing their Saturday half-holiday, chiefly because that half day

a week may be used in perfecting the rearrangement of departments resulting from the completion of the new seven-story factory building. To make up for this time some of the departments are running with night shifts. The Stanley Works have a good normal business. The North & Judd Mfg. Company report that while their new brass foundry is not as busy as it might be the general condition is normal. The Stanley Rule & Level Company report business to be very good indeed. The allied interests of the American Hardware Corporation, in addition to the P. & F. Corbin and Russell & Erwin Works, including the Corbin Screw Corporation and the Corbin Cabinet Lock Company, are in the same normal condition. It may readily be seen from these statements of facts that there is no ground whatsoever for the reports which emanate from the workmen that large numbers of men have been laid off.

The Gien Mfg. Company are stated to be the only concern at Ellwood City, Pa., now running double turn. The plant turns out wire specialties, comprising wire mats, woven fences and ornamental work for offices and banks.

Miscellaneous.

The Columbus Motor Car Company, Columbus, Ohio, have closed a contract for from 30 to 50 automobiles for Russia. The first cars for this shipment will be completed within a couple of months, and it will be necessary for the company to increase their facilities to take care of this and other contracts.

The Monarch Electric Mfg. Company, Warren, Ohio, capital stock \$10,000, have been incorporated by James F. Kistler, George C. Reeves, Samuel J. Parks, William Michael, Frank Myers, J. W. Slater, Wm. T. Smith and C. H. Sager. The company will manufacture incandescent lamps. Both Warren and Niles have submitted propositions to secure the location of the factory, but it is probable that the plant will be located in Warren in the factory formerly occupied by the Packard Motor Car Company.

Peterson, Seburn & Co., riggers and structural iron erectors, of Pittsburgh, have recently taken some good sized contracts. These include the erection of steel trestle works at the Cleveland Pumping Station, Cleveland, Ohio; the erection of a steel crane runway at the Sixteenth street yards of the Pennsylvania Railroad in Pittsburgh. The Variety Iron Works Company of Cleveland are furnishing the iron for the trestle work, and William B. Scaife & Sons Company of Pittsburgh are furnishing the iron for the crane runway. Peterson, Seburn & Co. are also erecting a steam plant for the River Coal Company at Brownsville, Pa., and a steam plant for the Brownsville Brewing Company at Brownsville, Pa.

The Barcalo Mfg. Company, Buffalo, N. Y., manufacturers of iron and brass bedsteads, will erect a one-story addition to their factory 102 x 106 feet, designed for the subsequent erection of four additional stories.

Harry T. Atkins, George Holly and Robert Mellman of Lebanon, Pa., will on December 8 apply at Harrisburg, Pa., for a charter for the Attwood Chain Works.

The works of the Bloomsburg Car Mfg. Company, Bloomsburg, Pa., are being operated overtime to complete a rush order of passenger cars for China. The cars are of a peculiar pattern, very long, of cheap construction, with seats running lengthwise along the sides and capable of seating about 200 passengers.

There is no truth in the current daily press reports that the American Smelting & Refining Company, New York, intend to abandon their plant at Omaha, Neb.

The Saunders-Smith Yacht Works, Essex, Conn., expect to have their new shops in operation by January 1.

The business of the Turner Brass Works, Chicago, which was established in 1871 by Edward S. Turner, was incorporated in 1889 for \$15,000. During the past fourteen years the business has gradually grown and been extended in various directions as opportunity offered, the latest move being an increase in capital stock from \$15,000 to \$150,000. This increase was brought about by taking over the surplus and including it in the capital.

The Advance & Fire Appliance Company have been incorporated at Milwaukee, Wis., with a capital stock of \$200,000 to manufacture fire extinguishing apparatus, engines, chemical apparatus for fire departments and work of guarding against and fighting fires. The officers are: President, Jos. F. Schener; first vice-president, Arnold Zander; second vice-president, H. M. Willis; treasurer, T. J. Callin, and secretary, E. M. Schuengel.

Whitehouse, Crimmins & Co., Walla Walla, Wash., manufacturers of sash, door and other supplies, whose plant was recently destroyed by fire, have completed a new plant, nearly ready to run, 120 x 120 feet, with boiler room 16 x 42 feet, both of brick construction.

The Wisconsin Brass Company, formerly known as the Turner-Armstrong Brass Company, Port Washington, Wis., have been reorganized under a new management.

Silverman Bros. Iron & Metal Company, Grand Rapids, Mich., have purchased three lots which will be used this winter as a track yard, but next spring will be improved with a warehouse, office building, sheds and minor buildings.

A. W. Parmelee, president of the Wire Goods Company, Worcester, Mass., has been elected president of the American Card Clothing Company, to succeed A. L. Kelley of Providence, R. I., resigned. A meeting of the stockholders of the American Card Clothing Company has been called to consider a plan of reorganization by which, if accepted, the stockholders will receive two shares of new stock for each five shares of present stock which will be surrendered. The company are a West Virginia corporation, with capital stock of \$1,500,000.

The Hayes Track Appliance Company, Geneva, N. Y., have incorporated for the manufacture of the Hayes derailing device and similar supplies. The company will not erect a plant at present, but will have the derailer made by contract. S. W. Hayes is president.

Following their announced policy of centralization, the International Harvester Company, Chicago, have decided to lay off 7500 of their 19,000 employees and thus effect a saving of \$5,000,000 a year. The first step in the direction of economy was taken Saturday, when 1500 employees of the Deering Division were notified that their services were no longer required. The action will also affect workers in Milwaukee, Springfield, Ohio and Plano.

The following Lebanon, Pa., companies have been awarded contracts by the United States Government: Union Boiler Works, ice and channel buoys, \$23,000; Treadwell & Co., sinkers, \$6000; West End Rolling Mill Company, chain, \$10,000; the Seidel Works, buoys, \$6000; Lebanon Chain Works, chain, \$87,000.

The Ruth Knitting Machine Company of York, Pa., have such a rush of orders that night work has been found necessary.

The United States Head Light Company, Buffalo, N. Y., are this week moving into their new plant, just completed at Letchworth and Dart streets, with New York Central trackage connection. The main building is 400 feet in length and two stories in height.

The large plant of the Buffalo Box Factory, Buffalo, destroyed by fire last week, is to be rebuilt at once. New machinery will be required throughout with the exception of engine and boilers, which were practically uninjured.

The Pittsburgh Heat & Power Company of Pittsburgh have been reorganized and will apply for a charter on December 23. The company purpose to furnish all kinds of heat and power, steam and electrical, the incorporators being H. J. Graham, Alexander Black and P. J. Alexander. They will occupy the Power Building, now being erected by Henry Phipps, on Cecil way, Pittsburgh. The Pittsburgh Light Company have been organized by the same parties.

The Ohio Iron & Brass Bed Company, Eaton, Ohio, contemplate the erection of a large extension to their works.

The Standard Steel Car Company of Pittsburgh, with works at Butler, Pa., have received an order from the Lorain Steel Company, Lorain, Ohio, for 30 specially designed steel ore cars of 100,000 pounds capacity each.

The Consolidated Match Company, Toledo, Ohio, are planning to rebuild their Toledo plant, which was destroyed by fire some weeks ago. George Mills, Toledo, architect, is preparing plans for the plant, which will include a building 60 x 120 feet, a building 90 x 90 feet, and a power plant. New machinery will be required throughout, as the old machinery was rendered useless by the fire. The plant will employ 400 hands, and it is the aim to have it in operation shortly after the first of the year.

The Morrison Automatic Safety Valve Company, Toledo, Ohio, are being organized with a capital stock of \$250,000, to manufacture a safety valve, the invention of F. B. Morrison of that city. The device is used in connection with air brake systems for train control.

The Buckeye Aluminum Company, Doylestown, Ohio, are making a number of improvements to their plant, including the installation of an electric lighting plant.

The Niles Car & Mfg. Company, Niles, Ohio, whose plant has been in idleness for several weeks, have taken a rush order for 25 street railway cars for the Cleveland Electric Railway Company of Cleveland, to replace a number of cars recently destroyed by fire. The affairs of the company have been in a somewhat unsettled condition, and a meeting will be held the latter part of this month to effect a reorganization. In the mean time the plant will be operated with a considerable force taking care of the order mentioned.

The Inland Steel Company, Chicago, report that negotiations are now on foot which look to an early settlement of the labor difficulty at their Indiana Harbor plant, which has been closed for two or three weeks because of the refusal of the tonnage men in the sheet mill and operatives in their other mills to accept a necessary reduction in wages. Their rolling mill at Chicago Heights has continued in operation uninterruptedly.

The Iron and Metal Trades.

From all the leading distributing markets come reports that the Southern Pig Iron producers have changed their attitude, and that for the present at least there is a truce in the fierce war. A considerable tonnage has been placed during the week, at first at or about \$9, Birmingham, and later the larger proportion at \$9.25, which is now generally demanded, while some ask \$9.50 for No. 2 Foundry. There is quite a considerable demand as yet unsatisfied. The situation is the material outgrowth of the very wide difference in prices between Southern and Northern Foundry, Mill and Basic Irons, which has diverted the great bulk of the business to the Southern stacks.

It is still an unsolved problem whether in the coming lull the Northern furnaces will be able to maintain their attitude of holding to higher values. In the Eastern markets where founders are conservative, and cling to old time mixtures with a heavy percentage of local brands, it looks as though the requirements will be large enough to hold values near the present level. In the Central West the complete cessation of buying on the part of the leading steel interest puts the merchant furnaces in a disadvantageous position.

There is good reason to believe that the principal American producer of Ferromanganese has withdrawn from the association which has existed off and on for a number of years between the English and American makers, the Germans having always held aloof. Prices have been softening in this country, and have reached the unprecedentedly low level of £7 17s. 6d. in London. One reason given for the low prices of Ferromanganese is the decline in Manganese Ore, which can now be purchased at tidewater in this country on the basis of 18 cents per unit.

The Steel market is exceedingly quiet and concessions are being made from the pool basis.

Generally speaking, there is very little doing in all markets and in all lines of Finished Iron and Steel. Interest centers in the widespread readjustments of wages which are in progress, notably as to sliding scales, expected in the near future. It is certain that Iron manufacturers will enter the new year with costs considerably modified, and they may be then in a position to meet buyers' views and take care of a good deal more tonnage. There seems little doubt that a good deal of business is being held back. For what is coming out concessions are being made in the majority of cases.

In the Metal Trade an interesting new development is that American Tin Plate is now being sold in Canada in direct competition with Welsh Plates.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type,
Declines in Italics.

At date, one week, one month and one year previous.

	Dec. 3, 1903.	Nov. 26, 1903.	Nov. 4, 1903.	Dec. 4, 1902.
PIG IRON:				
Foundry Pig No. 2, Standard, Philadelphia	\$15.00	\$15.00	\$15.00	\$23.00
Foundry Pig No. 2, Southern, Cincinnati	12.00	11.75	12.25	22.25
Foundry Pig No. 2, Local, Chicago	14.50	14.50	15.50	23.00
Bessemer Pig, Pittsburgh	14.85	14.85	15.70	21.75
Gray Forge, Pittsburgh	12.50	12.50	13.50	20.50
Lake Superior Charcoal, Chicago	16.50	17.00	17.50	26.00

BILLETS, RAILS, &c.:

Steel Billets, Pittsburgh	23.00	23.00	27.00	29.00
Steel Billets, Philadelphia	24.25	24.25	26.00	26.75
Steel Billets, Chicago	23.00	24.00	28.00	29.50
Wire Rods, Pittsburgh	31.00	31.00	33.50	34.00
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00

OLD MATERIAL:

O. Steel Rails, Chicago	9.00	9.00	12.50	18.75
O. Steel Rails, Philadelphia	11.75	12.00	12.50	21.00
O. Iron Rails, Chicago	13.00	14.00	17.00	24.50
O. Iron Rails, Philadelphia	16.00	16.00	17.00	24.00
O. Car Wheels, Chicago	13.00	14.00	17.00	24.00
O. Car Wheels, Philadelphia	12.75	12.75	15.00	20.00
Heavy Steel Scrap, Pittsburgh	12.00	12.00	14.50	21.00
Heavy Steel Scrap, Chicago	9.00	10.00	12.00	18.50

FINISHED IRON AND STEEL:

Refined Iron Bars, Philadelphia	1.35	1.35	1.45	1.92½
Common Iron Bars, Chicago	1.35	1.35	1.45	1.75
Common Iron Bars, Pittsburgh	1.34¾	1.34¾	1.40	1.70
Steel Bars, Tidewater	1.44½	1.44½	1.70	1.75
Steel Bars, Pittsburgh	1.30	1.30	1.60	1.60
Tank Plates, Tidewater	1.78	1.78	1.78	2.10
Tank Plates, Pittsburgh	1.60	1.60	1.60	1.85
Beams, Tidewater	1.73½	1.73½	1.73½	2.00
Beams, Pittsburgh	1.60	1.60	1.60	2.00
Angles, Tidewater	1.73½	1.73½	1.73½	2.00
Angles, Pittsburgh	1.60	1.60	1.60	1.95
Skelp, Grooved Iron, Pittsburgh	1.45	1.35	1.40	1.92½
Skelp, Sheared Iron, Pittsburgh	1.55	1.40	1.50	2.05
Sheets, No. 27, Pittsburgh	2.30	2.35	2.50	2.65
Barb Wire, f.o.b. Pittsburgh	2.50	2.50	2.60	2.45
Wire Nails, f.o.b. Pittsburgh	1.90	1.90	2.00	1.85
Cut Nails, f.o.b. Pittsburgh	1.90	1.90	1.90	2.05

METALS:

Copper, New York	12.12½	12.50	14.00	11.50
Spelter, St. Louis	4.50	5.00	5.40	4.82½
Lead, New York	4.10	4.10	4.40	4.10
Lead, St. Louis	4.00	4.00	4.30	3.97½
Tin, New York	25.80	25.55	25.75	24.75
Antimony, Hallett, New York	6.25	6.25	6.25	7.25
Nickel, New York	40.00	40.00	40.00	40.00

Tin Plate, Domestic, Bessemer, 100 pounds, New York	3.79	3.79	3.99	3.79
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Chicago.

FISHER BUILDING, December 2, 1903.—(By Telegraph.)

This is a dull, gray market in finished products. While prices are no lower, they are certainly no higher, and sellers are resting on their oars, running at the least possible expense, because they have concluded that no amount of effort on their part will bring them any considerable tonnage. In Pig Iron an awakening is evident. Three Southern furnaces, with an aggregate capacity of 850 tons daily, wired their Chicago representatives yesterday to book no orders for 1904 delivery at any price until notified. These furnaces had been selling on the \$9.25 basis, and at least one of them is sold up to its full capacity for the next three months. We quote \$9.25, Birmingham, or \$13.10, Chicago, for No. 2 Southern, and \$14.50, Chicago, for No. 2 Northern, as the fair minimum prices. Though rumors of sales of Northern Iron last week on the basis of \$9 or even less are still persistent, no positive confirmation can be secured. Low prices like these, if made at all, were doubtless made by furnaces which needed money badly and had Iron piled up, the trades being made on the basis of immediate shipment, cash payment and pledge of secrecy. One customer bought about 3000 tons of Basic Iron last Saturday at prices not divulged, though presumably at about \$9.25, Birmingham. Twenty-five hundred tons of Southern and 2500 tons of Northern were bought by one consumer for prompt delivery, but prices are not divulged. On the strengthening of the market last Saturday one consumer bought 1000 tons for January delivery at \$9.25, and a multitude of orders for 100 to 500 ton lots were placed. Bar Iron is selling in car lots at 1.35c. to 1.40c., base, and Bar Steel at 1.46½c., base. Plates show no change, either in price or demand. Structural are being

quoted universally at the new price of 1.76½c., Chicago, which is 1.60c., Pittsburgh, plus full freight. A number of large building operations in Chicago and other Western cities are now being figured up, and the outlook for placing a considerable tonnage of Structural Steel in this market is good. Wire products are still officially quoted at the old figures, though the leading producers now acknowledge that where lower prices are met in competition they make sufficient concessions to keep their old customers from going over to the enemy.

Pig Iron.—The most noteworthy event in the Pig Iron market last week was the purchase of something like 6000 tons of Basic Iron by a local mill and of 5000 tons, half Northern and half Southern, by a Milwaukee mill. Prices are withheld in both cases, but are understood to be about \$9.25, Birmingham, for the Basic, and about \$9, Birmingham, for No. 2 Southern. Most of the furnace representatives claim that their principals will not permit them to go below \$9.25, Birmingham basis, and that they are disposing of a large tonnage at that basis or above. Inquiries for probably 20,000 tons in the aggregate are in the market, split up into lots ranging from a single car to 1000 tons or more. Active buying commenced last Saturday, and on Monday three Southern furnaces, producing a total of 850 tons a day, announced to their representatives here that they were out of the market until further notice. The knowledge that the majority of Southern furnaces are refusing 1904 business at present prices leads sellers to believe that from now on the buyer will by no means have everything his own way. The following are the prices in carload lots at Chicago:

Lake Superior Charcoal.....	\$16.50 to \$17.00
Northern Coke Foundry, No. 1.....	15.00 to 15.50
Northern Coke Foundry, No. 2.....	14.50 to 15.00
Northern Coke Foundry, No. 3.....	14.25 to 14.50
Northern Scotch, No. 1.....	15.50 to 16.00
Ohio Strong Softeners, No. 1.....	16.80 to 17.30
Ohio Strong Softeners, No. 2.....	16.30 to 16.80
Southern Silvery, according to Silicon.....	14.60 to 15.10
Southern Coke, No. 1.....	13.60 to 14.10
Southern Coke, No. 2.....	13.10 to 13.60
Southern Coke, No. 3.....	12.60 to 13.10
Southern Coke, No. 4.....	12.10 to 12.60
Southern Coke, No. 1 Soft.....	13.60 to 14.10
Southern Coke, No. 2 Soft.....	13.10 to 13.60
Foundry Forge.....	12.10 to 12.60
Southern Gray Forge.....	11.85 to 12.35
Southern Mottled.....	11.85 to 12.35
Alabama and Georgia Car Wheel.....	21.85 to 22.85
Malleable Bessemer.....	14.50 to 15.00
Standard Bessemer.....	16.50 to 17.00
Jackson County and Kentucky Silvery, 6 to 10 per cent. Silicon.....	18.30 to 19.80
Basic Southern.....	13.10 to 13.35

Bars.—There has been no change in either trade conditions or prices since last week's report, though it is understood that a move is now on foot to extend the quarter extras to Steel Flats in conformity with rounds and squares on sizes larger than base. Steel Bars are firm at 1.46½c., Chicago, in carload lots, with 5c. to 10c. extra for less than carload lots. The usual quantity extras of 10c. per 100 lbs. for less than a ton of a size and 30c. per 100 lbs. for less than 1000 lbs. still prevail, both on Iron and Steel, in both the Bar and Hoop classifications. Iron Bars remain at 1.35c. to 1.40c., Chicago, for shipment in carload lots from mill, half extras applying to both the larger and smaller sizes. Steel Hoops continue to be offered at 1.75c. rates in car lots, 1.65c. rates in 250-ton lots, and 1.85c. rates for less than car lots, with the full freight of 16½c. per 100 lbs., and full card extras added. From store Steel Bars are selling at 1.60c. to 1.75c., with half extras on sizes smaller than base and quarter extras on sizes larger. Iron Bars are quoted at 1.75c., base, full extras; Hoops at from 2.10c. to 2.25c., according to quantity.

Structural Material.—Official prices on Structural Material from mill and store on the tonnage basis remain unchanged and business is light. A large number of Steel buildings, ranging from 200 to 2000 tons each, are being estimated upon by mills and shops, and the fact that work in both the jobbing Structural shops and in the mill shops is slack is resulting in figures sufficiently low for the entire building to discount largely any possible cut in the price of the material itself. Buildings are being offered much more cheaply now than will be possible toward spring, when the shops will be full of work, as prices below actual cost of fabrication are being made in many instances by firms, who are willing to make this sacrifice in order to keep the organizations intact until the active building season shall be on. It will take a deep cut in the price of Steel to offset the concessions that are now being made by firms figuring on buildings complete. Prices remain unchanged at 1.75c., Chicago, for I-Beams and Channels, 15 inches and under, and Angles, 3 inches on one leg and larger, with the regular 5c. extras for Tees, 3 inches and larger. From store Structural are being sold at 1.90c., cut to lengths 5 feet and over.

Plates.—There is little doing in the Plate market, buyers confining their purchases to actual needs in the anticipation of a cut in prices, which they believe must come. Official prices remain unchanged as follows: Tank Steel, ¼ inch and heavier, 1.75c. to 2c.; Flange, 1.85c. to 2.15c.;

Marine, 1.95c. to 2.10c.; Universal Mill Plates, 1.75c. to 2c. Plates from store continue to be sold at 2c. for ¼ inch and heavier, 2.10c. for 3-16 inch and 2.15c. for No. 8, with 25c. extra for Flange quality.

Cast Iron Pipe.—Seasonable dullness prevails, and a revival is not looked for until next March. Prices are unchanged at 4-inch, \$28.50 to \$29, and 6-inch, \$27.50 to \$28, in carload lots, for Water Pipe, and \$1 per ton higher for Gas Pipe.

Merchant Pipe.—Pipe makers insist that this year's business is up to the average standard and that November was, if anything, better than the same month of last year owing to the leniency of Jack Frost. Prices remain unchanged:

	Steel Pipe,		Guaranteed Wrought Iron,	
	Black.	Galvd.	Black.	Galvd.
Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
½ to ¾ inch.....	66.35	56.35	63.35	53.35
¾ inch.....	68.35	58.35	65.35	55.35
¾ to 6 inches.....	73.35	63.35	70.35	60.35
7 to 12 inches.....	67.35	57.35	64.35	54.35
Less than carloads, 12½ per cent. advance.				

Boiler Tubes.—The leading producer makes no change in prices, and takes the stand that no reduction in price would stimulate business until such a time as the other necessary component of the steam boiler are lower in prices. We quote as follows:

	Discounts, per cent.		
	Steel.	Iron.	Seamless steel.
1 to 1½ inches.....	40.85	37.35	53.35
1½ to 2½ inches.....	53.85	36.35	40.35
2½ to 5 inches.....	59.35	46.35	{ up to 4 in. 48.35
6 inches and larger.....	53.85	36.35	....

A large Eastern producer of Charcoal Iron Tubes is naming discounts very much better than the above list and securing a fair tonnage as a result. On Steel Tubes the larger boiler shops are able to get discounts 2 to 2½ per cent. better than the official prices named. Business from store is fairly active, the store man getting the benefit of some business that would otherwise go to the mill because of the fact that the Boiler manufacturer is buying Tubes only as he requires them. Prices remain as before from store, as follows:

	Steel.	Iron.	Seamless steel.
1 to 1½ inches.....	40	35	37½
1½ to 2½ inches.....	50	32½	35
2½ to 5 inches.....	57½	42½	45
6 inches and larger.....	50	32½	..

Sheets.—A little strengthening in the market is noted, and the character of the business done indicates that consumers are doing a little more than supplying their immediate necessities. Prices are unchanged from mill and store for Black and Galvanized. The following is the official schedule of Chicago prices: No. 10, 2.01½c. to 2.06½c.; No. 12, 2.06½c. to 2.11½c.; No. 14, 2.11½c. to 2.16½c.; No. 16, 2.16½c. to 2.26½c.; No. 18, 2.26½c. to 2.31½c.; No. 20, 2.31½c. to 2.36½c.; No. 22, 2.36½c. to 2.41½c.; No. 24, 2.41½c. to 2.46½c.; Nos. 25 and 26, 2.46½c. to 2.51½c.; No. 27, 2.51½c. to 2.56½c.; No. 28, 2.61½c. to 2.66½c. These are the carload prices, to which 10c. is usually added for less than carload lots, although sales of comparatively large quantities less than carload lots are made at the 5c., instead of 10c., advance. From store the following prices prevail: No. 10, 2.15c. to 2.25c.; No. 12, 2.25c. to 2.35c.; No. 14, 2.35c. to 2.45c.; No. 16, 2.45c. to 2.55c.; No. 18, 2.50c. to 2.60c.; No. 20, 2.55c. to 2.65c.; No. 22, 2.60c. to 2.70c.; No. 24, 2.70c. to 2.80c.; Nos. 25 and 26, 2.80c. to 2.90c.; No. 27, 2.90c. to 3c.; No. 28, 3c. to 3.10c.; No. 29, 3.10c. to 3.20c.; No. 30, 3.25c. to 3.35c. Galvanized Sheets sell from mill on the basis of 75, 10 and 10, Pittsburgh, in some cases this extreme price being quoted for Chicago delivery, although 75, 10 and 7½ is more usually quoted in carload lots, Chicago. From store Galvanized sells at from 75 and 5 to 75 and 7½ per cent. discount in carload lots or less.

Billets.—Forging Billets are still offered at from \$23 to \$24 per ton, Chicago, in car lots or greater, for either Open Hearth or Bessemer quality. No quotations have been made as far as can be learned on Rolling Billets.

Rails and Track Supplies.—The official price on Rails continues at \$28 per ton for Standard Sections. There is no such thing as an official price on lighter sections, the mills competing with each other freely on weights 40 lbs. and under; 12 to 16 lb. Rails would run at about \$30 to \$32; 20 to 40 lb., \$28 to \$30. Light Rails are sold from store on the basis of \$32 per net ton. Track Supplies, while nominally quoted at the following prices, are frequently shaded where quantities are large: Angle Bars, 1.90c. to 2c.; Spikes, 2c. to 2.10c.; Track Bolts, 3½ x 3¼ inches, 2.75c. to 2.85c., with 15c. advance for Hexagon Nuts.

Merchant Steel.—We revise last week's prices on Open Hearth Spring Steel and Smooth Finished Machinery Steel, reducing the former 25c. per 100 lbs. and the latter 5c. A few medium sized contracts have been placed in the last few days and specifications on existing contracts are fairly active. We quote as follows, in ton lots or greater, Chicago, for ship-

ment from mill: Open Hearth Spring Steel to the general trade, 2c. to 2.25c.; Smooth Finished Machinery Steel, 1.71½c. to 1.81½c.; Smooth Finished Tire, 1.66½c. to 1.76½c.; Sleigh Shoe, 1.51½c. to 1.61½c.; Cutter Shoe, 2.20c. to 2.30c.; Crucible Tool Steel, 6½c. to 8c.; Special Tool Steel, 12c. up; Shafting at 52 per cent. in car lots and 47 per cent. in less than car lots; Toe Calk Steel, 2.01½c. to 2.11½c.

Old Material.—The list of prices below shows strength compared with the heavy cuts in prices announced week after week previously. A factor in this check to the thoroughly demoralized condition of the market is the knowledge that before long heavy snow falls are likely to make it difficult to gather Scrap from the railroad yards and rights of way. It is said that a large agricultural interest has announced that it is in the market for 5000 tons of Scrap for delivery in the first six months of 1904, though this cannot be verified to-day. The present demand continues light and irregular, with the same uncertainty of the past few weeks. Quite heavy offerings are still coming forward, especially of railroad material, in which the most variation is noted in prices. Approximate quotations are as follows, per gross ton, f.o.b. cars, Chicago:

Old Iron Rails.....	\$13.00 to \$14.00
Old Steel Rails, mixed lengths.....	9.00 to 10.00
Old Steel Rails, long lengths.....	10.50 to 11.00
Heavy Relaying Rails.....	15.00 to 15.50
Old Car Wheels.....	13.00 to 14.00
Heavy Melting Steel Scrap.....	9.00 to 10.00
Mixed Steel.....	8.00 to 9.00

The following quotations are per net ton:

Iron Fish Plates.....	\$11.00 to \$11.50
Iron Car Axles.....	14.00 to 14.50
Steel Car Axles.....	13.00 to 13.50
No. 1 Railroad Wrought.....	10.00 to 10.50
No. 2 Railroad Wrought.....	9.00 to 9.50
Shafting.....	13.00 to 13.50
No. 1 Dealers' Forge.....	8.75 to 9.00
No. 1 Bushing and Wrought Pipe.....	8.50 to 9.00
Iron Axle Turnings.....	7.00 to 7.50
Soft Steel Axle Turnings.....	6.50 to 7.00
Machine Shop Turnings.....	6.50 to 7.00
Cast Borings.....	3.50 to 3.75
Mixed Borings, &c.....	3.50 to 3.75
No. 1 Bollers, cut.....	8.50 to 9.00
Heavy Cast Scrap.....	11.00 to 11.50
Stove Plate and Light Cast Scrap.....	8.50 to 9.00
Railroad Malleable.....	9.00 to 10.00
Agricultural Malleable.....	8.00 to 9.00

Metals.—Copper is still very unsettled, with another decline of ¼c., Casting Copper being sold at 12¾c. to 13c. and Lake ¼c. higher, in carload lots, Chicago. Lead is without change: 50-ton lots, 4.05c.; car lots, 4.10c. to 4.15c.; less than car lots, 4.35c. to 4.50c. Spelter is steady at 5.40c. in car lots to 5.75c. in less than car lots. Pig Tin is unchanged at 26¼c. in car lots and 26½c. in less than car lots. Old Metals have declined: Heavy Cut Copper, 10¼c.; Copper Bottoms, 9¼c.; Red Brass, 9¼c.; Lead, 3.85c., and Zinc, 3.62½c., spot.

Coke.—The market may be said to be \$5 to \$5.30, Chicago, for 72-hour Connellsville quality, the higher price being that named for Frick Coke. Buying is light, the demand being for quick shipments, in some cases a premium being paid for Coke on track by procrastinating buyers. Prices remain unchanged, quotations being: Frick, 72-hour, \$5.30; with other brands competing for business at from \$5 up for 72-hour Foundry grade, carload lots, Chicago. Pocahontas sells at from \$5 to \$5.25, Connellsville at from \$5.25 to \$5.50, New River at from \$5.15 to \$5.40, and Connellsville Furnace at from \$4.40 to \$4.65.

Philadelphia.

FORREST BUILDING, December 1, 1903.

It is a difficult matter to define the exact condition of the Iron and Steel interests. The undertone seems to be better, but when it is carefully analyzed there is little to be found to support that view. Probably the greatest help to the market has been the distribution of 200,000 to 300,000 tons or more of Pig Iron which had gradually accumulated on furnace banks. This Iron has not gone into consumption, but it has to a very great extent gone into consumers' yards, so that appearances are very much better, although as yet it is merely a change of location, and unless the demand continues furnaces will again begin to accumulate stocks. However that may be, it is obvious that a great deal of Iron has been bought during the past month, stimulated no doubt by the decreased furnace output, coincident with a gradual exhaustion of stocks in consumers' yards. In the near future, therefore, it will be less difficult to determine the relative proportions between supply and demand. If the furnaces are called upon to keep up their deliveries it will be satisfactory evidence that demand is abreast of the supply, while if buying again suffers a relapse it will be necessary to wait until well into January before deciding what the final outcome will be. There are some very encouraging features, however, one being that in almost every instance immediate shipments are required, and another that quotations are asked for on deliveries during the first quarter of 1904.

These are good features, although not entirely conclusive, as a wider view must be taken to cover the entire situation. The demand for Finished Material, including rolling mill and foundry products, must be considered, and also the interests that consume these products, and so far as these are concerned the outlook is not encouraging. All descriptions of Finished Material are dull, with no immediate prospect of improvement; and to some, although possibly to a lesser extent, the same may be said of the foundry interests, as well as the ultimate consumers of all the articles named. Comment will probably be made that it is not worth while to make one portion of the report favorable and another portion unfavorable, but a fair report of the situation is not a matter of choice but a statement of facts as they exist, and we believe these have been embodied in the remarks already made.

Pig Iron.—So far as this interest is concerned, the report must be moderately favorable. Sales have been on a large scale, and prices pretty well maintained, although no advance has been made. There is also some inquiry for deliveries during the first quarter of 1904, and some sales have been made; so that a point has been reached at which the market may be expected to assume a definite character. A few days more of such buying as there has been during the past two weeks will place sellers in a strong position, while a falling off in the demand would postpone the definiteness which the trade are anxious to establish. After the recent activity it is not unlikely that there may be a slight pause in the demand; so that it may be well into January, and perhaps later than that, before the situation is clearly disclosed, and until that occurs, the best that can be hoped for is to maintain current quotations. The curtailment of output has proved to have been a judicious measure, without which chaos would have prevailed by this time. Further action along the same lines may be required in the near future, but it is pretty clear that measures will be taken to prevent a runaway market, in either direction; hence business done on the basis of to-day's prices is not likely to involve much risk either to buyer or seller, although it is quite likely that the recent purchases will be followed by a period of inactivity. Sales, however, have been large enough to place the furnaces in an easy condition, so that there is not likely to be much change in prices in the near future, to-day's range being about as follows for Philadelphia and near-by deliveries:

No. 1 X Foundry.....	\$16.00 to \$16.50
No. 2 X Foundry.....	15.00 to 15.50
No. 2 Plain.....	14.25 to 14.75
Southern No. 2, rail shipment.....	13.25 to 13.50
Southern No. 2, on dock.....	12.75 to 13.00
Standard Gray Forge.....	13.75 to 14.25
Ordinary Gray Forge.....	13.25 to 13.50
Basic.....	13.75 to 14.00

Steel.—The demand is very light, and only small orders can be had at unchanged prices, say \$24.25 to \$25, delivered. There are no inquiries that seem likely to bring in an increased volume of business until after the turn of the year, after which some improvement is looked for.

Plates.—There is very little demand for large lots, so that mills are running on day to day business, with no immediate prospect of getting much work ahead. In the course of a few weeks something may develop, but order books have been so well cleaned up that it will require a heavy tonnage to place the mills in an easy condition. Prices are unchanged as last quoted—viz.:

	Carloads. Part carloads. Per pound.	Per pound.
	Cents.	Cents.
Tank Steel, ¼ inch and heavier.....	1.75	1.80
Tank Steel, 3-16 inch.....	1.85	1.90
Tank Steel, No. 8.....	1.90	1.95
Tank Steel, No. 9 and No. 10.....	2.00	2.05
Flange or Boiler Steel.....	1.85	1.90
Marine and Commercial Fire Box Steel.....	1.95	2.00
Still Bottom Steel.....	2.05	2.10
Locomotive Fire Box Steel.....	2.25	2.30
Plates over 100 to 110 inches wide.....	\$0.05 per lb. extra.	
Plates over 110 to 115 inches wide.....	.10	" "
Plates over 115 to 120 inches wide.....	.15	" "
Plates over 120 to 125 inches wide.....	.25	" "
Plates over 125 to 130 inches wide.....	.50	" "
Plates over 130 inches wide.....	1.00	" "
Sketches.....	.10	" "
Complete circles.....	.20	" "

Structural Material.—Small lots are about all that are wanted at the present time, so that deliveries can be promptly made. Apart from two or three very large contracts which have already been exploited for all they are worth, prospects at the moment are not particularly encouraging, although the idea prevails in some quarters that a good business will develop early in the new year. Prices unchanged—viz., 1.73½c. to 1.85c. for Beams, Channels and Angles, according to specifications.

Bars.—Business remains in a very depressed condition and prices for Bar Iron are again lower. There is no uniformity, however, as some still quote 1.45c., delivered, for Best Refined Iron, although others quote 1.40c., which is considered a fair price for good Iron. There are still others, however, who quote 1.30c. to 1.35c., but quality is probably made to accord with the price. Steel Bars are dull but un-

changed at 1.43½c. to 1.45c., for carload lots as a minimum quantity.

Sheets.—The situation is unchanged and at the moment there is very little demand. Prices depend a good deal on quantity, quality, &c., but large orders are subject to sharp competition, and very low prices are quoted when there is a chance of securing specifications for a good sized lot.

Old Material.—The demand is very slow, although at inside figures some business is done, but the market is uncertain, as mills are only buying from hand to mouth. Bids and offers for deliveries in buyers' yards are about as follows:

Old Steel Rails.....	\$11.75 to \$12.00
Heavy Steel Scrap.....	11.50 to 12.00
Low Phosphorus Scrap.....	20.00 to 21.00
Old Steel Axles.....	14.00 to 15.00
Old Iron Rails.....	16.00 to 16.50
Old Iron Axles.....	16.00 to 16.50
Old Car Wheels.....	12.75 to 13.50
Choice Scrap, R. R. No. 1 Wrought.....	14.50 to 15.50
Country Scrap.....	13.00 to 14.00
Machinery Scrap.....	12.50 to 13.50
No. 2 Light Scrap.....	11.00 to 11.50
No. 2 Light (Ordinary).....	9.00 to 9.50
Wrought Turnings.....	9.50 to 10.00
Wrought Turnings, Choice Heavy.....	10.00 to 10.50
Cast Borings.....	6.75 to 7.25
Stove Plate.....	10.00 to 10.50
Wrought Iron Pipe.....	10.00 to 10.50

Cleveland.

CLEVELAND, OHIO, December 1, 1903.

Iron Ore.—The order of retrenchment, which seems to make itself very generally felt in the Iron and Steel community, has raised the question whether prices of Ore will be reduced at the opening of another season or will remain as they are. It now develops that among the Ore men themselves a radical difference of opinion exists. The Bessemer old range producers are disposed to leave prices where they are, while the producers of lower grade Ores will be willing to grant a reduction. No conference has yet been called for the settlement of this tangled problem. The movement of Ore down the lakes will continue for a few days only. The last cargo was shipped away from the head of the lakes to-day and will be several days in getting to Lake Erie ports. The Ore piles up above have been frozen, and boats engaging in that trade until now have been seriously delayed. Boats have likewise been delayed at Lake Erie ports, taking from four to ten days in getting their cargoes lifted. It is now apparent that the amount of Ore which will be left on the docks will exceed any showing which has ever been made. The figures for November, while not completed, indicate a very light movement, and that less than 24,000,000 tons will have been brought down during the year. This contrasts with 27,400,000 tons by all lake last year. No question of freights has been raised.

Pig Iron.—The market has shown greater strength in spot buying of Foundry during the week, with a few more inquiries for the future. It is evident, however, that the foundrymen are a little timid as yet about heavy future contracting. Strength comes to the Northern producing interests from the better tone which is introducing itself into the Southern market. The Southern works are getting pretty well filled with orders, and are not taking Northern contracts so freely. The Northern consumers are finding, too, that they have about all that grade of Pig they can stand in their mixtures, and the two influences are working for a better trade in Northern Iron. The Southern price has strengthened. It is difficult now to find any material for sale at \$9, Birmingham, the general price being about \$9.25 for No. 2. This has brought into the Northern trade a good run of orders, for delivery through December. The buying of material for 1904 delivery has started out fairly well. Many of the consumers of low grade Iron have bought rather liberally or late, and those using the higher grade material have bought a portion of their supply through the first quarter. The low grade sales have covered the first half. The whole market has had a much better tone to it, and the talk of a further reduction of prices has been stopped. This may be renewed, however, when it is known that some of the stacks are in a fair way to reduce cost of production. The market is represented by the following quotations, all f.o.b. Cleveland:

Northern Coke, No. 1 Foundry.....	\$14.00 to \$15.50
Northern Coke, No. 2 Foundry.....	14.50 to 15.00
Northern Coke, No. 3 Foundry.....	14.00 to 14.50
Southern Coke, No. 1 Foundry.....	13.75 to 14.25
Southern Coke, No. 2 Foundry.....	13.25 to 13.75
Southern Coke, No. 1 Soft.....	13.75 to 14.25
Southern Coke, No. 2 Soft.....	13.25 to 13.75
Jackson County, 8 per cent. Silicon.....	18.45
Hanging Rock Charcoal, No. 1.....	23.45
Southern Charcoal, No. 1.....	20.75 to 21.25
Lake Superior Charcoal.....	18.50 to 19.00

Many of the furnace workmen in the Valleys have been approached on the subject of accepting reduced wages and have agreed to take their share of the loss if it will assure them work. The danger of a general strike is thus obviated to a large extent. No furnaces which have been out of blast

have resumed operations, while others are going out this week. Production will continue to be curtailed through December and January. Bessemer and Basic Irons are about off the market, but are being quoted nominally at \$14.50, Pittsburgh, with the understanding that few sales are possible until after the first of the year. The Coke situation is steady, with deliveries free and the trade inclined to be soft. The best grade of Coke is selling at \$2.65 at the oven, with some of the High Sulphur Cokes selling at \$2.40.

Finished Iron and Steel.—The trade has not improved to any appreciable extent, but is overcast by the general spread of the belief that a further reduction of prices in some staples may be expected by the first of the year. This report has been so generally credited that what business is to be done is laggard. The revival in the purchase of Steel Bars, which immediately followed the cut in prices, has disappeared and the market is again easy. The spurt was due to the fact that the consumers had held back their orders while prices were being discussed. The exhaustion of that supply of orders and the approach of inventory time have deprived the market just now of any considerable amount of business. It cannot be learned that the prices have anything to do with the situation. The market holds at 1.30c., Pittsburgh, for Bessemer, and 1.40c., Pittsburgh, for Open Hearth. The buying of Bar Iron has been weak and variable. Reports have been around again that the market has broken, but this cannot be substantiated. The general run of orders is being taken on the basis of 1.30c., Youngstown. The Sheet Steel market showed some livelier tendencies after the decline in prices, even though that was but a slight cut under the prices which had been made quietly to the trade by some of the mills for several weeks before the public announcement. The trade is now easing slightly, due to the shutting down of work for the winter and the approach of inventory time. There is, however, a good run of orders. The prices hold steady on the following bases: No. 27, One Pass Cold Rolled, in car lots at mill, 2.35c.; No. 14 Black Sheets, out of stock, 2.15c.; No. 27 Black Sheets, out of stock, 2.50c. There have been persistent rumors of cuts in Structural prices, but so far these have not materialized. Some statements have been made indicating that a good sized tonnage is being held back in anticipation of a cut the first of the year, but it cannot be learned that there is enough trade in prospect to make any appreciable difference to the mills should the price be sharply reduced. The market is very narrow. It is understood, of course, that several big ships would be contracted for if prices were reduced in both Structurals and Plates, the estimated quantity held back being about 10,000 tons. The market holds at 1.60c., Pittsburgh, for Structurals and Plates. Very little is being done in either Billets or Rails, and the market is dull. Prices are unchanged at \$28, Pittsburgh, for Standard Rails, and \$23.50, Cleveland, for 4 x 4 Bessemer Billets.

Old Material.—A consumer came into the market this week asking 100 tons of Car Wheels a month for a year ahead. He offered ruling prices, and the dealers are holding off. Few sales of any sort of Scrap are made now out of the yards, the dealers doing a brokerage business only and selling Material at a sacrifice. What are recognized as intrinsic values are being disregarded entirely, and the sales are mostly all forced, being made at what the Material will bring. Prices revised are quoted as follows, all gross tons: Old Steel Rails, \$14 to \$15; Old Iron Rails, \$16; Old Car Wheels, \$13.50 to \$14; Railroad Malleable, \$13; Cast Borings, \$3. All net tons: No. 1 Railroad Wrought, \$11 to \$12; No. 1 Busheling, \$10; Wrought Turnings, \$6; Iron Car Axles, \$15.50 to \$16; No. 1 Cast Scrap, \$11.50; Stove Plate, \$9.

Cincinnati.

FIFTH AND MAIN STS., December 2, 1903.—(By Telegraph.)

The general situation in the Pig Iron market, so far as Southern Iron goes, may be regarded as stronger. Northern Irons are still out of the market in all contested districts, the margin between the two classes being still from \$1 to \$3, according to locality. There has been a rather heavy tonnage sold, some as low as \$9 basis for No. 2 Foundry, Birmingham; most of it, however, at \$9.25. Now it is believed that the \$9 iron, even for spot shipment, is all absorbed, and sales are ranging from \$9.25 to \$9.50, with the majority of furnaces refusing first half of quarter business at less than \$9.50, Birmingham, for No. 2 Foundry. Buyers seem to be aware of the change in the situation and a great number are seeking to place orders at \$9 and \$9.25. These same buyers a week ago were refusing offers on this same basis. Even in view of this stiffening, it can hardly be claimed that the market permanently bettered, and the general outlook is an uncertain one. Freight rates from Hanging Rock district to Cincinnati, \$1.15, and from Birmingham, \$2.75. We quote, f.o.b. Cincinnati, as follows:

Southern Coke, No. 1.....	\$12.50 to \$13.00
Southern Coke, No. 2.....	12.00 to 12.50
Southern Coke, No. 3.....	11.50 to 12.00

Southern Coke, No. 4.....	11.00 to	11.50
Southern Coke, No. 1 Soft.....	12.50 to	13.00
Southern Coke, No. 2 Soft.....	12.00 to	12.50
Southern Coke, Gray Forge.....	10.75 to	11.00
Southern Coke, Mottled.....	10.75 to	11.00
Ohio Silvery, No. 1.....	17.65 to	18.15
Lake Superior Coke, No. 1.....	15.65 to	16.15
Lake Superior Coke, No. 2.....	15.15 to	15.65
Lake Superior Coke, No. 3.....	14.65 to	15.15
<i>Car Wheel and Malleable Irons.</i>		
Standard Southern Car Wheel.....	\$20.00 to	\$21.00
Lake Superior Car Wheel and Malleable	19.00 to	20.00

Pittsburgh.

PARK BUILDING, December 2, 1903.—(By Telegraph.)

Pig Iron.—At a number of blast furnace plants in the Shenango and Mahoning Valleys a 10 per cent. reduction in wages has gone into effect, and this will probably become general at all blast furnaces in the Central West. A better inquiry for Pig Iron is reported, and stocks in consumers' yards are low, shown by the fact that when contracts are placed the buyer almost invariably specifies prompt shipments. Bessemer Iron is held at \$14, Valley, or \$14.85, Pittsburgh. We note sales of about 5000 tons at this price. Southern furnaces are much stiffer in their ideas of prices and are now holding No. 2 Foundry at \$9.25, Birmingham, or \$13.60, Pittsburgh. Northern No. 2 Foundry is fairly firm at \$14, Pittsburgh, but it is possible that some sellers might slightly shade this price. We note a sale of 300 tons of Northern No. 2 at \$14, Pittsburgh. Forge Iron is quiet, and Northern is held at about \$12.75, Pittsburgh. Southern Forge can be delivered here at lower prices.

Steel.—The market is very quiet and consumers continue to place contracts only for small lots for actual needs. The uncertainty as to whether present prices of Steel will hold will probably be removed after the meeting of the Steel mills, which is scheduled to be held in New York on December 18. Very little Steel is sold at the official prices, as most consumers are covered by sliding scale contracts, which give them Billets, Sheet and Tin Bars at prices somewhat under the official figures. Bessemer and Open Hearth Billets are held at \$23, long Sheet Bars at \$24 and cut Bars at \$24.50, Pittsburgh, Youngstown or Wheeling delivery.

Coke.—Another meeting of the committee recently appointed by the Coke operators to devise some scheme to put the Coke business on a better basis is to be held this week. A central selling agency and also a pooling scheme have been proposed, and these plans will be considered at the meeting.

(By Mail.)

Matters in the Iron trade have shown no important changes since our last report. It is the general expectation that trade will move along about as it is now until after the first of the year, when a better demand is expected. Much interest attaches to the meetings of the Billet pool, to be held in New York on Friday, December 18, and also to the Plate and Structural meetings, to be held prior to that date. If present prices of Steel are reaffirmed and no change is made in Plates or Structural Material, it is believed buyers will come in the market and place orders more liberally than they are doing now. A readjustment in prices of Pipe may possibly be made during this month, as there is more or less cutting being done on the smaller sizes in both Iron and Steel. The meeting of the independent Sheet mills, held to-day in the Hotel Lincoln, this city, was an important one and was well attended. The matter of removing limit of output was fully discussed, and also the matter of the reductions in wages in the nonunion Sheet mills. It was the sense of the meeting that the independent mills could not continue to pay present Amalgamated scale rates and compete with mills that have a much lower rate of wage. There is a little better feeling in Pig Iron, particularly among the Southern furnaces, and we are advised that Southern No. 2 Iron is now being held at \$9.25, Birmingham, equal to \$13.60, Pittsburgh. The Southern furnaces absolutely refuse to book orders for No. 2 Iron for delivery next year at \$9 a ton, but are quoting \$9.25 to \$9.50, at furnace. Bessemer Iron is fairly firm at \$14, Valley, or \$14.85, Pittsburgh, and several fair sized sales, amounting to 5000 to 6000 tons, have been made in the past week at this price. Forge Iron is neglected and Northern No. 2 is quoted at about \$14, Pittsburgh. Very little Steel is moving, and the amount of Billets and Sheet Bars sold at the official prices is very small indeed, as practically all consumers of Billets, Sheet and Tin Bars are covered by sliding scale contracts, based on the price of Bessemer Iron, and which gives these consumers their Steel at considerably less than pool prices. Demand for Finished Iron and Steel is fair, possibly a little better than a week or two ago, but there is some unevenness in prices in the Sheet, Pipe and Wire trades.

Structural Material.—No large work is coming up, and it is not likely any important contracts will be placed until after the first of the year. The Beam Association is to meet in New York on December 17, but it is not anticipated there will be any change in prices. A fair amount of small

orders is being placed, but none of the Structural mills are running to full capacity. We quote: Beams and Channels, up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6, 1.60c.; Zees, 1.60c.; Tees, 1.60c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c.

Ferromanganese.—The situation in Ferromanganese is somewhat mixed. We quote 80 per cent. Ferro, English or Domestic, at \$48 to \$49, delivered for carloads, while for 50-ton lots and over \$47, delivered, is being quoted.

Plates.—While buyers continue to place orders for Plates in a hand to mouth way, actual tonnage is said to be a little heavier. Reports are that the Steel car interests are booking some orders, and, if this is true, a heavier demand for Plates should soon develop. We understand that a meeting of the Plate Association will be held during this month. We quote: Tank Plate, ¼-inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.90c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price up to 3c. Plates more than 100 inches in width, 5c. extra per 100 lbs. Plate 3-16 inch in thickness, \$2 extra; gauges Nos. 7 and 8, \$3 extra; No. 9, \$5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots; terms net cash in 30 days.

Steel Rails.—The domestic market is very quiet, and orders for 1904 delivery on the books of the Rail mills are said to aggregate about 750,000 tons. A good deal of foreign business is under negotiation, and a local mill has taken a contract for 5000 tons for shipment to Mexico. We quote at \$28 at mill for Standard Sections.

Rods.—There is very little demand for Rods, owing to the generally quiet condition of the Wire trade. We quote Bessemer and Open Hearth Rods at \$31, Pittsburgh.

Iron and Steel Bars.—Demand for Bars continues somewhat quiet and is mostly in small lots, representing actual needs of consumers. Implement makers are said to be specifying fairly well on contracts. There is some disappointment felt that the heavy reduction in Steel Bars made a month ago has not brought about a better demand. Conditions in the Bar Iron trade in the East are reported as very unsatisfactory, and some very low prices are being made. However, the Eastern mills are endeavoring to get together and have a uniform scale of wages, and are now at work on this project. Bar Iron is fairly firm at 1.30c., Youngstown, or 1.34¼c., Pittsburgh.

Sheets.—Much interest attaches to the meeting of the independent Sheet mills, in session in the Hotel Lincoln, in this city, to-day. Two important matters will come up for decision, one being the elimination of limit of output and the other the heavy reduction in wages in nonunion Sheet mills. It is evident that it will be impossible for Sheet mills who sign the Amalgamated scale to pay present wages in competition with other mills where wages are 20 to 25 per cent. lower. Demand for Sheets is only fairly active, and less than 50 per cent. of the Sheet mill capacity is active. Orders are mostly for small lots for actual needs, jobbers refusing to contract. We quote No. 27 Black Sheets, box annealed, one pass through cold rolls, in carloads and larger lots, 2.30c. to 2.35c., and No. 28, 2.35c. to 2.40c. These prices represent the general market in carloads. Galvanized Sheets have weakened and are now quoted at 80 per cent. off in carloads. In net prices this discount means 2.80c. for No. 24, 3c. for Nos. 25 and 26, 3.20c. for No. 27, 3.40c. for No. 28 and 3.80c. for No. 29. Jobbers charge the usual advance over above prices for small lots.

Spelter.—The market has still further declined, and prime Western Spelter for December delivery is offered at 4.88½c., Pittsburgh. Demand is dull and the tendency of prices is downward.

Tin Plate.—Some belated orders for Tin Plate are being placed, but trade generally is quiet, and many of the important mills are idle. We quote 100-lb. Cokes at \$3.60, Pittsburgh.

Railroad Spikes.—There is a fair demand for these, and local mills are quite busy. We quote at \$1.85 per 100 lbs.

Merchant Steel.—Trade continues quiet, orders being of a hand to mouth character for actual needs. A better demand is looked for after the first of the year. We quote: Tire Steel, 1.50c.; Open Hearth Spring, 1.90c. to 2c.; Toe Calk, 1.70c. to 1.80c.; Sleigh Shoe Steel from 1.90c. to 1.95c. The above prices are for carloads at mill, the usual differentials being charged for small lots. Tool Steel is 6c. to 8c. for ordinary grades, and Cold Rolled Shafting is 52 per cent. off in carloads, and 47 per cent. in less than carloads, delivered in base territory.

Skelp.—There is very little doing and we quote Grooved Iron Skelp at 1.45c. to 1.50c., and Sheared at 1.55c. to 1.60c., f.o.b. Pittsburgh.

Merchant Pipe.—The Pipe market is very quiet, buyers placing orders only for small lots and for actual needs. There is an impression that prices on Pipe may be changed

before long, and the trade is naturally holding off. Concessions in prices are more easily obtainable and on Steel Pipe amount to about 5 and 2½ per cent., and on Iron to about 5 per cent. Discounts to consumers in carloads, on which the above concessions are obtainable, are as follows:

	Steel.		Wrought Iron.	
	Black.	Galv.	Black.	Galv.
	Per cent.	Per cent.	Per cent.	Per cent.
¼, ½ and ¾ inch.....	68	58	65	55
1 inch.....	70	60	67	57
¾ to 6 inches.....	75	65	72	62
7 to 12 inches.....	69	59	66	56

Merchant Boiler Tubes.

	Steel.	Iron.
1 to 1½ inches.....	42½	39
1½ to 2¼ inches.....	55½	38
2½ to 5 inches.....	61	48
6 to 13 inches.....	55½	38

Coke.—The Coke market shows very little change, either in the direction of output or of shipment. Of the 22,737 ovens, 11,522 were idle last week, and additional ovens will probably be blown out this week. Connellsville Furnace Coke has been offered as low as \$1.65 to \$1.75 at oven, and 72-hour Foundry at \$2.50 to \$2.65. Main Line Coke is being offered at considerably lower prices.

Iron and Steel Scrap.—The Scrap market continues very quiet, and consumers decline to take in Material this month, which will be given over to large extent to shut downs for repairs and stock taking. Heavy Melting Stock is quoted at \$12 to \$12.50 in gross tons, and No. 1 Wrought Scrap at \$11 or lower in net tons.

Birmingham.

BIRMINGHAM, ALA., November 29, 1903.

The improvement in the demand for Iron which these letters have noted of late has increased, and the business for the past week was evidence indisputable that the buyers were very much interested in the market and convinced that the time for loading up had arrived. For the first time in a long while sellers, in instances not infrequent, scaled down the orders before they would accept them. For instance, one large buying interest who had been holding off came into the market for 20,000 tons for prompt and nearby delivery. The order was accepted for half that amount. They then immediately put in another order for 10,000 tons, extending the delivery on part of it. Other instances could be given, all tending to show that the feeling is gaining ground that the bottom on this turn has been reached, for the present anyway. There is in such a state of affairs less pressure on prices. It is now getting the quantity the buyers want. Those who have held off are now scrambling to get in, and though efforts are made to secure the lowest prices quoted on this down turn, the opportunity has passed and \$9.25 is the minimum price now beyond all question, and at that figure but a limited amount can be secured, because the sellers at this price are very limited in number. There are some interests who were sellers at \$9.25 that have marked up prices to \$9.50 and \$9.75, and at these figures there are now indifferent sellers. Their sales have scaled down their stocks to such a point that they can afford to hold what is unsold for a better price, and they are doing it. They are encouraged to this course by the fact that about ten furnaces in the State are out of blast now, with no tangible evidence that they will resume in the very near future. There is no risk in asserting that the market would have to show a very material improvement to induce some of them to resume Iron making. The day of extremely low cost has passed, and the relative dependence of cost and selling price of Iron will have to undergo a transmogrification before stability is secured.

The places of the small buyers have been usurped by those of large pretensions, and all lines of the trade have been represented. The Pipe interests were free buyers. In some instances they did not get all they wanted, because some of the sellers had sold to the limit they had set, reserving a margin for supplying their regular order trade. The foundry trade also came in for very respectable lots. In fact, all lines of the Iron trade are now buyers. The great bulk of the buying was and is for nearby delivery. Frequent efforts were made to have orders accepted for delivery the first half of 1904, but as a rule they were not encouraged. There were some exceptions, but they were not frequent. When made they were limited to the first quarter. The extent of sales for this delivery is shown by the statement of a leading interest to the effect that though their sales so far this month exceed 80,000 tons, not one-tenth of it was for 1904 delivery. Nearly everything is prompt delivery. This same leading interest state that their shipments for this month will be 40,000 tons and more, and that for December they expect to ship at least that much, and if everything works favorably they will exceed that amount. This one interest have not done all the selling, so one can form some idea of the activity that has characterized the buying during the current month.

There can be no question as to an improved feeling in the market and a confidence which was a stranger to the

trade at the beginning of the month. To ship what has been sold will occupy the attention of the furnaces now the balance of this year.

Cars continue to be in fair supply, and while there is yet some complaint from some sources, important shippers are making no complaints; and the railroads are bending all their energies to prevent a congestion of Iron shipments over their lines.

As to the export trade, the more hopeful can say of it, "It is not dead, but sleeping." There was some of it worked, but in a very limited way, and all the particulars both as to volume and price are withheld. Compared to the domestic trade it as yet cuts no figure, and in the face of current and anticipated domestic demand interest in it is lagging.

In Coal there is a fine trade, and from shippers there is a continuance of complaints of lack of cars to take promptly their output. The low water in the Mississippi River has prevented the usual shipment of "tows," and there has been a keen demand on the Alabama mines to supply the wants of river points. It is quoted all the way from \$1.20 to \$1.65, at the mines, depending upon the character of the Coal and conditions of sale. Coke is in moderate demand, and as a good part of it was contracted for periods covering the year the output is practically marketed before it is made.

Some Coal land deals are on the "tapis," and so near conclusion that one can safely announce them. One interest, represented by Virgil J. Long of Texas and the Messrs. Schumaker and Hasket of Pennsylvania, have purchased a mine at Lynn, in Winston County, which it is their intention to develop extensively.

As evidence of the growth of the industrial interests, it can be stated that the Blakeslee Company have since they commenced operations here doubled the number of tools to keep up with the business offering. It is probable that the manufacture of automobiles will be added to their business in the near future.

During the past week we were visited by some gentlemen representing some large banking interests in London. They were taken over the district, and besides being close questioners, they seemed to be very much gratified at what they saw. What their object might be is simply a matter of conjecture. The demand for Pipe continues to be fine, and all the Pipe companies have of late been good buyers of Pig Iron. That is a tangible test of activity with them.

Metal Market.

NEW YORK, December 2, 1903.

Pig Tin.—Speculative operations have continued in London, and as a result the market values have been maintained here as well as abroad. Purchasers do not show any inclination to relieve the London operators of the heavy load which they are trying to unload, however, and business is very quiet. It was thought that the fact that stocks here are shown to be rather light would induce consumers to enter the market, but those who held this belief were doomed to disappointment. Business was just as light as it has been throughout the last few weeks. At the close to-day spot to December deliveries were quoted 25.80c. to 26c. London closed to-day £119 and £120 2s. 6d. Deliveries during the month amounted to 2500 tons, the total increase for the 11 months of this year now being 4600 tons, compared with the same period of last year. The deliveries in London and Holland during the 11 months of this year show an increase of 475 tons as compared with the same period of last year. Shipments from Straits for November were 800 tons smaller than for the same month of last year; for the 11 months of this year they show an increase of 591 tons, as compared with the corresponding period of last year. Australian shipments during November were 2 tons over November, 1902; the total for the 11 months of this year shows 1040 tons more than the same period last year. The total visible supply on November 30 is 3151 tons below that of November 30 of last year. The total statistics for Europe and the United States, as compiled by C. Mayer, secretary of the New York Metal Exchange, show:

	Tons.
Total visible supply November 30, 1903.....	15,195
Against visible supply October 31, 1903.....	15,515
Against visible supply November 30, 1902.....	18,346

Copper.—Prices have scored further heavy declines and still consumers here have remained out of the market. Business during the last week showed no improvement. There was some business for Europe, which, we are informed, was transacted at figures somewhat below those quoted. The "official" quotations have declined to 12.25c. to 12.37½c. for Lake, 12.12½c. asked for Electrolytic, and 12c. asked for Casting. Outside of the Exchange these prices could be cut ¼c. to ½c. on Lake and Casting, and ¼c. on Electrolytic. London also fell off considerably in price, closing to-day £55 for spot, £54 12s. 6d. futures, and £59 10s. for Best Selected. Exports during the month of November were the largest of any month of this year, amounting to 14,522 long tons. The total for the 11 months of this year shows a

decrease of 31,012 tons, as compared with the corresponding period of last year.

Pig Lead.—Spot is still firmly held here at 4.25c. Thirty-day shipments are quoted 4.10c. The American Smelting & Refining Company continue to quote on a basis of 4.10c. for 50-ton lots of Desilverized, New York delivery, shipment within 30 days. St. Louis is quoting 4c. London has advanced to £11 3s. 9d.

Spelter.—Is weak, spot has declined to 5.25c., nominally, and December and January delivery is offered at 4.75c. St. Louis has declined to 4.50c., and London has declined to £20 10s.

Antimony.—The market is quiet and unchanged. Cookson's is quoted at 7c., Hallett's at 6¼c. and other brands at 5¾c.

Nickel.—No change is noted in this market, 40c. to 45c. being quoted for large lots, and 50c. to 60c. for smaller quantities.

Quicksilver.—The market is quiet, but steady. Flasks of 76½ lbs. are quoted at \$47.50. London has declined to £8 5s.

Tin Plates.—It is reported in the trade that the large producers have sold a large lot for export. The price is said to have been \$2.60, delivered in Canada. This price, it will be noted, is below the Swansea market. There is no change in the situation here. Quotations are made on the basis of \$3.60 per box of 14 x 20 100-lb. Cokes, f.o.b. mill, equivalent to \$3.79, New York. Welsh Plates are 11 shillings, f.o.b. Swansea.

An Association to Promote Exports.

The Foreign Trade Association of America, which has been chartered under the laws of the State of New York, to promote the export trade of the country, held its first regular meeting at 66 Broad street, New York, on December 1.

The subject under discussion was the recent concession of 33 1-3 per cent. granted by the Trunk Line Association on freight rates on manufactured iron and steel products for export. The feeling among other manufacturers, it developed at the meeting yesterday, is that this is a discrimination against other classes of manufactured products, and resolutions were adopted calling for the appointment of a special committee to be known as the Export Rate Committee of the Foreign Trade Association of America, authorized to employ independently the ablest counsel and rate experts and to collate information "tending to cause rates for export business to be reduced to a basis more in harmony with actual requirements."

The following officers were elected, to serve until January 12, when the first annual meeting will be held and officers elected for 1904: President, Aristides Martinez of Longman & Martinez; first vice-president, W. C. King of the General Chemical Company; second vice-president, R. R. Fogel of R. R. Fogel & Co.; treasurer, William M. Hollins of H. B. Hollins & Co.; secretary, W. E. Simpson, editor of *The Banker and Miner* of Mexico. These officers also constitute the Board of Directors.

The following Nominating Committee, to choose a ticket for the annual election on January 12, was chosen: B. Lissbarger of B. Lissbarger & Co., H. B. Cook of the Cook & Bernheimer Company, George F. Duyster of Rounds & Dillingham, Charles Hess of Charles Hess & Co., and J. W. Hamilton of Milliken Brothers.

Trade Publications.

The Stiles-Morse Company, Chicago, have issued a large eight-page folder describing the machinery built by E. W. Bliss & Co. of New York, whose Western distributors they are. This folder illustrates and describes 24 different Bliss presses, punches, shears and hammers, and is enlivened with happy maxims and aphorisms.

Catalogue No. 10 of the Armstrong Bros. Tool Company, Chicago, illustrates their tool holders for metal working tools. The catalogue is pocket size, 68 pages, printed on bright golden-rod stock, with heavy water proof covers. It is illustrated throughout and contains many tables of value to users of tools.

The Lansing Motor & Pump Company, Lansing, Mich., send out a neat folder describing their 5 horse-power gasoline engine and the Lansing feed grinder.

The Kempsmith Mfg. Company, Milwaukee, Wis., are sending out a huge postal card, nearly 9 x 11 inches, illustrating their milling machines attractively.

PERSONAL.

Graham Fraser has been elected vice-president and general manager of the Dominion Iron & Steel Company, Sydney, Cape Breton, N. S. He has resigned as managing director of the Nova Scotia Steel Company, but will retain a consulting position. N. C. Armstrong, New York agent of the Dominion Company, has resigned, to take effect with the closing of the New York office.

R. S. Henderson of Sharon, Pa., connected with local iron interests and also a member of the firm of Henderson Brothers of Cleveland, Ohio, has recently returned from a visit to London and Paris.

The Board of Directors of the Allis-Chalmers Company at a recent meeting elected John B. Allen of Chicago a vice-president and general manager of the company, making him the active and responsible manager in charge of manufacturing, selling and general operations.

Edwin W. Whitmore has resigned as treasurer of the Prentice Brothers Company, machine tool manufacturers, of Worcester, Mass., to engage in other business. He is succeeded as treasurer by Harry V. Prentice, heretofore the superintendent of the company. Mr. Whitmore has for many years devoted attention to the extension of the European business of the concern, and is widely known among machine men in this country and abroad.

Harry Munhall, formerly superintendent of the blooming mill department of the Duquesne Steel Works of the Carnegie Steel Company, at Duquesne, has resigned on account of ill health and will go to Texas for an extended stay. Charles Maeder has been appointed to succeed him. Mr. Munhall was presented with a gold watch and chain by his former associates.

Powell Stackhouse, president of the Cambria Steel Company; John W. Townsend, vice-president, A. P. Robinson, secretary and treasurer; Effingham B. Morris, chairman of the Board of Directors, and directors R. Francis, Theodore N. Ely and Frank Firth, the two last named being general officers of the Pennsylvania Railroad Company; E. C. Felton, president of the Pennsylvania Steel Company, Steelton, Pa., and G. F. C. Smink, president of the Reading Iron Company and director of the Pennsylvania Steel Company, all of Philadelphia, are in Johnstown this week for the purpose of visiting the mills of the Cambria Steel Company. On Tuesday evening the party was given a banquet by Charles S. Price, general manager, and other local officials, including about 20 superintendents of the departments.

J. Wilbert Deetrick has been appointed superintendent of the Valley Mill of the Republic Iron & Steel Company, at Youngstown, Ohio, succeeding George M. Summers, resigned.

J. W. Robbins, formerly superintendent of Claire Furnace of M. A. Hanna, at Sharpsville, Pa., has been appointed superintendent of Mabel Furnace of Perkins & Co., Limited, of Sharpsville. He will have charge of both stacks.

George C. McKee, formerly at the Ohio Works of the Carnegie Steel Company, has been made chief engineer of the Youngstown Foundry & Machine Company, at Youngstown, Ohio.

Charles C. Henderson, for some years general manager of the pipe and tube mills of Spang, Chalfant Company, has resigned and has gone to California for an extended visit. The employees of the plant, through a committee, presented Mr. Henderson with a gold watch and chain.

Messrs. Manson, of Back & Manson, iron and steel merchants, London, and Hill of Middlesbrough, England, who have passed several weeks visiting the leading iron centers in this country and Canada, sail from New York for Liverpool on Saturday.

John W. Gates has been elected a director of the Republic Iron & Steel Company, succeeding August Belmont, resigned.

The Claire Furnace Company of Sharpsville, Pa., have filed application for a dissolution of the corporation.

The New York Machinery Market.

NEW YORK, December 2, 1903.

Improvement in the machinery trade is very noticeable, and a better feeling as to the near future prevails. It cannot be said that conditions have been reversed, and where but a few days ago demand was almost entirely absent trade has fully recovered its activity; but buyers are gradually throwing off their recently assumed hystancy, and machinery merchants are securing orders in increasing volume. The atmosphere is clearing, and if it continues to, the business lull of 1903 will soon be looked back upon as a scare that was largely unwarranted. The extremely pessimistic views that found very frequent expression a short time ago have been eliminated. Of course, there are still doubtful ones who predict that all sorts of things may happen between this time and the Presidential election, but from the present outlook nothing but improvement of conditions is in sight.

Since our last issue the statements which we made regarding the orders placed by the New York Central & Hudson River Railroad for equipment in connection with their New York electrification project have been confirmed, and official data relative to the main details have been given out. We are in a position now to state that the order given to the General Electric Company calls for eight turbo-generators and 30 electric locomotives. Further details are given in the following official statement:

"The New York Central & Hudson River Railroad Company have placed an order with the General Electric Company for eight turbo-generators of a capacity of 7500 horse-power each. The turbines are of the four-stage vertical Curtis type. The generators are 25 cycle, triphase, generating a current at a pressure of 11,000 volts. This is by far the largest order for steam turbines ever placed in this country or abroad.

"The New York Central Company have also placed with the General Electric Company in co-operation with the Schenectady works of the American Locomotive Company an order for 30 electric locomotives. These locomotives are of an entirely new design, will weigh 85 tons each, with an adhesive weight on the drivers of 67 tons. Each locomotive will have a capacity of 2200 horse-power, and will be capable of hauling a train of 500 tons at a speed of 60 miles an hour. This is by far the largest order for electric locomotives ever placed in any country."

We are officially advised that the statement which we printed relative to the boiler order placed with the Babcock & Wilcox Company is practically correct. The order was placed and it called for boilers of about 625 horse-power each, but information as to the exact number of these boilers it was deemed wise to withhold from the public at present. That the condenser order was awarded to the Worthington branch of the International Steam Pump Company is also confirmed.

We are informed that the electric locomotives ordered are only to be used for express train or heavy service, and that the suburban trains will be operated on the same principle as the electric trains running on the elevated structure in New York, having their motors directly connected to the trucks of the cars. This type of train will also be operated in the Rapid Transit Subway, and it is assumed in the trade that new coaches will be put on by the New York Central for their suburban service, and that they will be of a type and size to permit their being run right through the subway.

In the machine tool trade a great deal of importance is being attached to a meeting of builders of milling machines which is to be held in the Iroquois Hotel, Buffalo, N. Y., next Tuesday, December 8. We are informed that this meeting is not to be for the purpose of arriving at an agreement as to prices, but will have as its object the determination of certain fixed dimensions for the various sizes of milling machines. In other words, it is intended to fix upon certain standard dimensions and have all builders adhere to them. It is well known that keen rivalry has existed for some time of late among the builders of milling machines regarding the scope, capacity and general design of the several sizes of machines which they build. This has led to the redesigning of one make of machine after another, the last one going just one better and giving just a little more than the one previous. This competition in design is still going on, and the object of the Buffalo meeting is to arrive at some basis whereupon a halt can be called. The advocates hold that something of this nature must be done in order to place the machine upon an economic basis of production. Those who are in favor of standardization say that in practically all types of machine tools, excepting milling machines, certain sizes or units are accepted as standard, and builders produce their machines accordingly. A similar condition in the milling machine trade, they say, would obviate the necessity of getting out new designs and patterns, &c., with practically each lot of machines turned out. There are others who claim that in making any agreement whatever as to the design of machines there is danger of retarding advancement in milling machine practice. They hold that the keen competition has been a good thing for the

milling machine. The advocates of the plan aver, however, that they are not seeking to place any dampening influence upon the adding of new or advanced features on the machines, but simply desire to see uniformity as to dimensions. The outcome of the meeting will be awaited with considerable interest by every one connected with the machine tool industry. About ten builders of milling machines will be represented at the meeting.

Business in the machine tool trade has shown improvement over last week. We understand that the Westinghouse Electric & Mfg. Company are placing nice orders for their new Pittsburgh plant. Less than half of the new equipment for this plant has been purchased so far. As we predicted some months ago, the machinery is being obtained in small lots from time to time instead of in one large group.

The Bethlehem Steel Company are said to have been good customers within the last few days. We understand that the equipment purchased is of a nature employed in the production of projectiles. Linked with this is a report emanating from another source to the effect that this concern were awarded a large projectile order by a foreign government. It is thought in certain quarters of the trade that the Japanese Government, who were recently inquiring for about \$150,000 worth of projectile making machinery, which they never purchased, may have placed an order with the Bethlehem Company for the projectiles and abandoned their plan of producing them themselves.

The Holthoff Machinery Company of Cudahy, Wis., who have recently affiliated with the Loomis-Pettibone Gas Machinery Company of 52 William street, New York, have just purchased a substantial consignment of machine tools. The orders were placed in the West. It will be recalled that this concern are to build the Crossley gas engines and gas plant machinery. It is thought that the new machinery is intended for this work.

Considerable surprise was occasioned in the trade over the announcement that the James Cooper Mfg. Company of Montreal, Canada, have been placed in the hands of a receiver. This concern, it will be remembered, are the Canadian manufacturers producing the Ingersoll-Sergeant mining machinery and appliances. They have recently equipped a fine large new plant with machine tools secured to a large extent in this country.

We are officially advised that the car building plant to be built for the Armour interests will be erected under the supervision of the Armour Car Lines, whose general offices are located at 205 La Salle street, Chicago. William E. Sharp, the superintendent, will have charge of the new project. An account giving the sizes of the various building was given in our issue of November 19. Mr. Sharp advises us that he is not yet in the market for new machinery with the exception of an electric transfer table, combination punch and shears and dry kiln blowers. The equipment question proper will come up for decision shortly, as it is expected to have the shops completed by April 1 next.

J. B. Barnes, superintendent of motive power and machinery of the Wabash Railroad Company, informs us that there is nothing definite at this time relative to the equipment of the new Wabash shops on the Buffalo division in Canadian territory.

The recent purchase of the Grant Tool Works, Franklin, Pa., by William J. Bleakley for a nominal sum was in the interest of a committee who are planning a reorganization of the company for the purpose of continuing the plant in operation. It is proposed to raise \$80,000 cash, half of which is to be used for the payment of debts and half for fresh working capital. The remaining \$200,000 indebtedness is to be settled by notes and bonds. The committee consists of Charles Miller, E. W. Snook and William J. Bleakley.

Fay & Bowen, manufacturers of gasoline motors and launches, intend to move their plant from Auburn to Geneva, N. Y., where they will have greatly increased facilities to take care of their business, which has increased 70 per cent. the past year. It is proposed to organize a new company, with a capital stock of \$40,000, half of which has already been subscribed, and to erect a plant on a site with shipping facilities on Lake Erie, the Erie Canal, and the New York Central and Lehigh Valley railroads. The firm are composed of Walter L. Fay and Ernest S. Bowen.

The James D. Lalor Engineering Company, Philadelphia, Pa., are asking estimates for a three-story and basement factory building, 62 x 140 feet, to be erected on the outskirts of Philadelphia. The owner's name, exact location and purposes for which the building is to be used are withheld for the present. It will be remembered that the Lalor Engineering Company were in charge of the work of construction of the new plant of the Westmoreland Boiler Company, at New Kensington, Pa., and that contracts for the buildings were let some months ago. They inform us that they are not ready to take up the matter of equipment for the Westmoreland shops.

An indication of the large amount of river and harbor improvement work now under way or contemplated by the United States Government is given by the fact that at present ten suction dredges are being built, two of which will be sent to the Great Lakes, two to New York Harbor, two to

the Mississippi River, two to Charleston, S. C., one to Galveston and one to Savannah, Ga. The contracts for building these vessels have been distributed to a large number of builders, possibly for the purpose of hastening their completion. Five are being constructed by the Maryland Steel Company, two by the Jas. Reilly Repair & Supply Company, and one each by the W. R. Trigg Company, the Petersburg Iron Works Company and the New York Shipbuilding Company. The mechanical equipment of the dredges for salt water service will include surface condenser outfits with Blake air pumps, feed pumps, fire pumps, &c. The dredges for the Great Lakes are provided with very large Blake cross compound, double acting, air pumps and jet condensers, with the usual complement of Blake vertical duplex feed pumps, fire pumps, &c. The air pumps are of a very novel arrangement, inasmuch as it is possible by the manipulation of valves and cocks provided for the purpose to cut each pump in half and run one side entirely independent of the other side. This practically provides a spare pump in each installation without the necessity of being overweighted with two duplicate machines, and at the same time secures the advantages of compound steam cylinders. These dredges are the largest in capacity ever built, and are designed in each case for the special work which they will have to do. They are self propelling sea going dredges and do not depend upon the assistance of tugboats or other craft to move them around from point to point. Some of these vessels are fitted with immense bins, in which the dredged material is deposited and, when full, the vessel propels herself out to deep water, dumps the sand or mud and steams back to repeat the operation. Others are arranged for depositing the dredged material into large scows fastened alongside the vessel.

The Patapsco Machine & Supply Company, Baltimore, Md., have organized for the manufacture of a full line of brass hardware and marine telegraphs, and will do a general machinery supply business. They have a thoroughly equipped machine shop and foundry at 210-212 Patterson street, and have recently secured a large warehouse at 410 East Pratt street, which they are converting into general show rooms and offices. The officers are Charles Tyler, president, and Walter B. Tyler, treasurer and general manager.

What is said to be the first contract for large turbines for factory driving in India has been secured by the Westinghouse interests. The order is for the electrical equipment of the mills of Birkmyre Bros., located on the River Hugli in the vicinity of Calcutta, and includes two turbines of 1300 kw. each, direct connected to generator. The contract also includes a large number of motors, switchboards, auxiliary apparatus, transformers and two cranes. The boilers will be of British make.

The following bids were opened November 24 for supplies for the Mare Island and Puget Sound navy yards:

- Bidder 25. Fuller Company, Detroit, Mich.
- 42. General Electric Company, Schenectady, N. Y.
- 56. Holtzer-Cabot Electric Company, Boston, Mass.
- 87. B. F. Sturtevant Company, Boston, Mass.
- 92. Buffalo Forge Company, Buffalo, N. Y.
- 106. Herron, Ricard & McCone, San Francisco, Cal.
- 123. Western Electric Company, New York.

Class 2. Electric blower and fans—Bidder 42, \$108 and \$121; 56, \$143; 123, \$187.

Class 3. Fan blowers and exhausters—Bidder 42, \$1113.10 and \$1224.41; 87, \$1604.15; 106, \$1695; 56, \$1772; 92, \$1809.10.

Class 4. Generating sets, &c.—Bidder 42, \$2915.72; 25, \$3019.

Several good sized orders for machine tools have just been placed by the Tindel-Morris Company of Eddystone, Pa., proprietors of the Frankford Steel and Forging Works and the Eddystone Engineering Works. Owing to the recent expansion of the company's business, which includes several additional lines, it has been found necessary to augment the equipment of the Eddystone plant very materially. The company are now building at this plant the Tindel high duty cold metal cutting saw and the Tindel patent lathe for turning crankshafts and crank pins. The demand for these tools has been so great that the inauguration of large departments for producing them has become imperative. The latter machine is being built only for the export trade at present. The company announce that their increased equipment places them in a position to consider manufacturing under contract all classes of high grade machine work furnishing assembled machinery or finished parts.

New York.

NEW YORK, December 2, 1903.

Pig Iron.—There is decidedly more inquiry from all quarters, and the tone is improving. The weakness in Southern Irons is checked and the scramble for tonnage seems over for the present. While it is claimed that in some instances during the past week as low as \$8.75 for No. 2, Birmingham, has been done, the large sellers are now holding out for \$9.25. The Northern makers have not shown any disposition to meet the parity of Southern Iron and are now more

encouraged in the hope that they will be able to maintain their relatively higher prices, because the necessities of buyers indicate a steady demand for some time to come for prompt Iron. Offers of round lots have been made to Southern makers by exporters, but have led to no business, because the producers decline to come down to the level at which sales abroad could be effected. There is considerable inquiry for Basic Pig, which Alabama makers are offering on the basis of \$9 to \$9.25, Birmingham, while Virginia furnaces are offering at about \$13.50, delivered, Central Pennsylvania. We quote Northern No. 1 X Foundry, \$15 to \$16; No. 2 X Foundry, \$14.50 to \$15, and Gray Forge, \$13.75 to \$14.50, tidewater. Tennessee and Alabama brands are quoted \$13.50 to \$14 for No. 1, \$13 to \$13.50 for No. 2, and \$12.50 to \$13 for No. 3.

Steel Rails.—The market is exceedingly quiet, and no transactions of any magnitude are reported. There is a good deal of competition for what business is coming up in Light Rails, the mills which reroll Old Steel Rails being particularly active.

Cast Iron Pipe.—The New York City business referred to last week was secured by contractors, and it is not known yet from whom they will purchase the Pipe. The city will this week place further orders, but they are small, possibly not exceeding 700 tons in all. No other domestic business appears to be pending at this time, and little is expected until plans are consummated for the coming season. Carload lots are quoted at \$28, gross ton, for 6 to 10 inch, and \$27 for 12-inch upward, at tidewater. These prices are shaded on large quantities.

Finished Iron and Steel.—The quiet conditions prevailing in the Structural trade are indicated by the fact that an order for 2000 tons of bridge work for a Western railroad company, to be delivered during the winter, is the largest single transaction that has transpired during the week. The immediate prospects in the building trade are not particularly encouraging. Contractors are endeavoring to finish such work as they have on hand, but report few new projects likely to develop into actual business at present. There is every reason, however, to expect that after the labor troubles are settled building operations in this vicinity will again become active. A great deal of work is known to be held back on this account. The Plate trade is quiet, current business being confined to small orders, and these are by no means numerous. The Pennsylvania Railroad Company's tunnel work in this city will require about 25,000 tons of Plates, on which bids are now being received. The size of this order would seem to make it desirable, but as the Plates will be pressed into special shapes and fitted for particular parts of the work the competition for the business will be limited to mills having such facilities. Contracts are also to be let shortly for five new ferry boats for the Staten Island service, which will take a total of 2000 tons of Plates. The demand for Bars shows but little improvement. Manufacturers, however, are hopeful, expressing confidence that the very limited stocks in buyers' hands must compel a larger volume of business whenever they feel assured that the market is on a firm basis. The revival of the Eastern Bar Iron Association is expected, and if this occurs it may have beneficial effect. We quote, at tidewater, as follows: Beams, Channels and Zees, 1.75c. to 2c.; Angles, 1.75c. to 2c.; Tees, 1.80c. to 2c.; Bulb Angles and Deck Beams, 1.90c. to 2.85c. Sheared Plates, in carload lots, are 1.78c. to 1.85c. for Tank, 2c. to 2.10c. for Flange, 2.10c. to 2.20c. for Marine and 2.25c. upward for Fire Box. Refined Bars are 1.40c. to 1.60c., according to quality; Soft Steel Bars, 1.44½c. to 1.50c.

Old Material.—Few transactions are reported, and most of these are what might be termed forced sales. A quantity of Heavy Melting Steel Scrap has been sold at \$10.75, delivered at buyers' works in Eastern Pennsylvania. Buyers report a large lot of Wrought Scrap secured at about \$10. Some small sales of Relaying Rails have been made at our quotations. Further business has been secured in short pieces of Steel Rails for export. Taken as a whole, however, the volume of business in Old Material is quite light. Approximate figures are as follows, per gross ton, New York and vicinity:

Old Iron Rails.....	\$14.50 to \$15.50
Old Steel Rails, long lengths.....	11.50 to 12.50
Old Steel Rails, short pieces.....	10.50 to 11.00
Relaying Rails, heavy sections.....	18.00 to 19.00
Old Car Wheels.....	12.00 to 13.00
Old Iron Car Axles.....	16.50 to 17.50
Old Steel Car Axles.....	15.00 to 15.50
Heavy Melting Steel Scrap.....	10.50 to 11.00
No. 1 Railroad Wrought Iron.....	12.50 to 13.50
Iron Track Scrap.....	11.50 to 12.50
Wrought Pipe.....	8.50 to 9.50
Ordinary Light Iron.....	6.50 to 7.00
Cast Borings.....	4.50 to 5.00
Wrought Turnings.....	7.00 to 8.00
No. 1 Machinery Cast.....	11.50 to 12.50
Stove Plate.....	9.50 to 10.50

CHARLES JAMES ADOLPH DICK of Fornebo, Lysaker, Norway, founder of the phosphor-bronze industry in the United States, died in England, November 21, 1903.

Chicago Machinery Market.

CHICAGO, ILL., November 28, 1903.

The machinery and tool situation in the West is improving. Current orders, though not heavy, indicate that the stout hearted boiler maker, structural iron worker, sheet metal worker and foundry proprietor is taking advantage of the present lull in his business to put in necessary repairs and improvements. The character of inquiries received indicates that this process of betterment in iron working shops generally will be still more marked as the season advances. Plants that are too weak financially or lack the courage to follow suit will work at a disadvantage with their braver compeers when business does resume.

Dealers in second-hand machinery and tools are getting rather the better of the argument, as compared with the manufacturers and dealers who sell only the new equipments. Mining machinery and tools are quite active, particularly those intended for coal mining propositions. Business in cranes and hoists is also all that could be expected. The feeling generally in this market is that the winter and spring months of 1904 will be good ones, in some lines promising to exceed all previous records. For the 18 months ending April last the shops have been running to their full capacity, frequently on day and night turns, leaving no opportunity for making needed repairs to machines that were forced to their ultimate limit, and the far seeing proprietors of such industries are preparing their plants so that when another high pressure season opens they shall be ready to take care of the business with equipment that is faultless in every important detail. It is true that many prospective buyers of machinery and tools are holding off, in the hope of securing lower prices because of the reduced cost of raw materials which enter into machinery. That such reductions are not impossible goes without saying, but that the saving would be inconsiderable as compared with the profit due to taking advantage of a slack manufacturing season is taken into account by manufacturers who have learned by experience the value of the familiar phrase, "Do it now."

Machine Tools and Machinists' Supplies.

The Ransom Mfg. Company, Oshkosh, Wis., report a very quiet trade during the past month. The demand for small grinders has been steady but for large tools very light. The most notable order taken during the month was from the International Steam Pump Company for four 24-inch motor driven water tool grinders. Pacific Coast trade is especially prominent at this time.

Williams, White & Co., Moline, Ill., builders of heavy iron working tools and machines, say that there has been an improvement in the number of inquiries and orders received during November, compared with the slow trade of some months since, and that, everything considered, business has been very good. They have not reduced wages, are running ten hours a day and giving employment to their full force of men.

The George Whiting Company, Chicago, are still very busy and have a considerable amount of trade in sight. Collections have been unusually good during November—probably better than at any previous time in the company's history. Business is better than is usually the case just preceding the inventory season, with prospects favorable for a fair year in 1904.

The B. F. Barnes Company, Rockford, Ill., report a slight falling off in business, although the outlook for future trade seems to be quite promising. Inquiries are being received from all over the country, indicating a good winter's business, though not as heavy as during the corresponding month a year ago.

The J. H. Dawson Machinery Company, Chicago, general machinery dealers, say that the business situation in the machinery line does not show any improvement.

The Fox Machine Company, Grand Rapids, Mich., makers of pattern shop machinery and a general line of tools, report that the most activity in the machinery business at the present time seems to be in Europe. In the eastern part of the United States it is extremely dull, but in the central part and on the Pacific Coast it is fair. They do not anticipate much change in business until after the first of the year, when a more satisfactory situation is looked for.

Chicago Pneumatic Tool Company, Chicago, advise that the outlook in the pneumatic tool business is very promising. The business transacted in the month of November, while not greatly in excess of that for the previous month, is about 33 per cent. greater than that transacted for the month of November, 1902. The characteristic feature of the pneumatic tool business in their experience has been the in-

clination on the part of purchasers to adopt a special make of tools as a standard, and to use no other. The foreign outlook in their line is particularly cheerful, and foreign offices report a steady increase in business received.

Chas. H. Besly & Co., Chicago, report general business very good. Important shipments of grinders have been made to Indiana, New York, Michigan, Missouri, Washington and Illinois. A large demand is being received for oil cups from makers of agricultural implements and iron working machinery and from automobile manufacturers. A good demand is also being experienced for temper taps, especially from bolt works. They are having a great many inquiries from Europe and South America for their specialties.

The Kemp Smith Mfg. Company, Milwaukee, Wis., say that in their opinion manufacturers are placing orders quite encouragingly. They believe that labor saving machinery will be in good demand for some time to come. Among recent buyers of Kemp Smith millers have been the following: Champion Shoe Machine Company, St. Louis, Mo.; Wyand Steam Turbine Mfg. Company, Camden, N. J.; Johns-Pratt Company, Hartford, Conn.; United States Government, several for use on battle ships; A. Leschen & Sons Rope Company, St. Louis, Mo.; E. A. Fargo, Taunton, Mass.; J. P. Danielson & Co., Jamestown, N. Y.; Chicago Telephone Supply Company, Elkhart, Ind.; H. H. Franklin Mfg. Company, Syracuse, N. Y.

Hoefler Mfg. Company, Freeport, Ill., manufacturers of drill presses and metal working machinery, say that their business is slackening up somewhat, although they still have unfilled orders on their books. They look for an awakening in demand after the holidays.

Engines and Boilers.

The Nordberg Mfg. Company, Milwaukee, Wis., say that November has failed to show any general resumption of activity in their line. The inquiries received are mainly for small units needed by established concerns, probably to replace other worn out units. Most people seem to prefer awaiting the developments of December and the opening weeks of the new year before deciding definitely upon a course of action.

The Witte Iron Works Company, Kansas City, Mo., report business quiet in all lines.

The Vilter Mfg. Company, Milwaukee, Wis., say that the demand continues good, with sufficient business closed during the last few weeks to necessitate operating their works day and night, as heretofore, for some time to come.

Charter Gas Engine Company, Sterling, Ill., report activity at this time, especially in hoisters for mining work, important orders having been received from Arizona. The outlook is more encouraging than for a number of weeks.

The Aetna Foundry & Machine Company, Springfield, Ill., advise that the demand for hoisting machinery does not seem to abate, and it will take several months yet for the manufacturers to catch up with orders already booked. They report also that if all the coal mine enterprises which are contemplated are fulfilled, business will be of sufficient volume to keep them at their full capacity during the entire coming year. Among other recent sales have been hoisting outfits to Borders Coal Company, Marissa, Ill., and Kortkamp Coal Company, Hillsboro, Ill.

The Whitehead Machinery Company, Davenport, Iowa, are experiencing the usual good trade at this season of the year from electric light plants for second-hand engines and boilers. Apparently there will also be a large trade with the flour mills in the spring, many of them now making inquiries for large equipment, second hand, but of the better types. Inquiries from the Pacific Coast are especially heavy and practically all for large equipment, 500 horse-power and upward. Rolling mill inquiries are quite plentiful, but practically none of them result in business, operators apparently doubting the wisdom of investment. There is a marked scarcity of the smaller sizes of Corliss engines in the second-hand market.

The John Wishart Machinery Works, Chicago, report running full time on steam engine and boiler specialties, boiler feed pumps, &c. Prospects for increased business the first of the year are excellent.

The Chicago House Wrecking Company, Chicago, dealers in second-hand machinery, tools and materials, advise that they have not found any falling off in the volume of business. Inquiries are just as heavy as usual, and sales have been as plentiful on boilers, engines and machinery in general during the past 30 days as heretofore. Boiler and engine sales are mostly for 100 horse-power sizes. Two orders have been booked in power equipment for Mexican points.

Miscellaneous.

Stephens-Adamson Mfg. Company, Aurora, Ill., advise that there is somewhat less demand for power transmitting machinery than there has been for some months past. There is, however, a very fair demand for elevating and conveying machinery, and they are quite busy in these lines. Among other jobs which they now have on hand for execution is one for the elevating and conveying machinery for the new fire proof elevator of the Jos. Schlitz Brewing Company.

Milwaukee, Wis., which comprises three or four carloads of machinery.

The Northern Engineering Works, Detroit, Mich., state that at present their shop is running full capacity, principally on traveling cranes and the Newton cupola. Among recent sales are electric cranes of from 5 to 25 tons capacity to the following: Gerst Bros., St. Louis; Olds Gasoline Engine Works, three cranes; Omaha & Council Bluffs Railway Company, American Steel & Wire Company and Green's Car Wheel Company. They also sold hand power cranes of the same capacity to the Cambria Steel Company, Jackson & Church and the Indianapolis & Cincinnati Traction Company, besides several other smaller hand power cranes. The volume of business is not as great as it was two or three months ago, but indications point to improvement soon after the beginning of the new year.

The Holthoff Machinery Company, Cudahy, Wis., builders of mining machinery, boilers, &c., say that inquiries are being received with about the same regularity as during the past year, and there is no indication at present of a change in the situation. Sales during the past three or four weeks have been odds and ends and of no especial importance, except a contract with the Canadian Copper Company for copper converters.

The American Machinery Company, Grand Rapids, Mich., say that while the rush which was noticeable at this time last year is absent, the prospect for steady and legitimate trade in the near future has very considerably brightened of late. They have information of probable demands for machinery which assure them of a market for full capacity for several months in the future. Several enterprises that had been indefinitely postponed are now being taken up again and pushed for early completion. There have been a large number of small orders for the smaller establishments scattered over the United States and Canada, with a very brisk trade in Great Britain. Among the larger machines which the company have sold might be mentioned the following: Oliver wood trimmers to the Dominion Coal Company, Glace Bay, N. B.; C. A. Lawton & Co., Green Bay, Wis.; De Pere Lumber & Fuel Company, West De Pere, Wis.; Atlanta, Knoxville & Northern Railway Company, Knoxville, Tenn.; Buffalo, Rochester & Pittsburgh Railway Company, Du Bois, Pa.; Consolidated Foundry Company, St. Johns, Newfoundland; Pittsburgh & Lake Erie Railway Company, duplicating machine shipped last month, McKee's Rocks, Pa.; Klassen's Pattern Works, Kansas City, Mo.; Weber Gas & Gasoline Company, Kansas City, Mo.; Jas. Fleming, St. John, N. B., and McFarlane, Thompson & Anderson, Fredericton, N. B. They have also sold several wood trimmers for Belgium and France through Fenwick Freres & Co., Paris. Oliver universal saw benches have been sold to Blacklock Foundry Company, South Pittsburg, Tenn.; De Loach Mill Mfg. Company, Atlanta, Ga.; Glover Machine Works, Marietta, Ga.; Harron, Rickard & McCone, San Francisco; J. S. Schofield & Sons, Macon, Ga.; Washburn Shops, Worcester Polytechnic Institute; Williams & Wilson, Montreal, Que.; James Fleming, St. John, N. B., and McFarlane, Thompson & Anderson, Fredericton, N. B.

The Industrial Works, Bay City, Mich., report business considerably restricted in volume and not nearly as active as at this time a year ago.

The Stover Mfg. Company, Freeport, Ill., find business in wind mills and feed mills improving somewhat among the domestic trade, and foreign orders coming in much larger volume than at any previous time, and are planning to send a representative abroad to look after export business.

The American Steam Pump Company, Battle Creek, Mich., say that business held up well during November, and the outlook is that business for the year will be about the same as that of 1902.

The Goodman Mfg. Company, Chicago, say that the demand for coal cutting and coal hauling machinery is still very large. They are still behind in making deliveries, owing to rush of orders, and are working to full capacity. They report that the third-rail haulage system, for which they are exclusive agents, is proving successful, especially where the grades are heavy.

The S. Obermayer Company, Chicago, state that business has been fair with them during November. Up to about three weeks ago sales equalled those of the corresponding time last year, but since the first of the month business has dropped off a little, although not as much as was expected would be the case.

The Green Engineering Company, Chicago, state that there is a great deal of prospective business in view in grates, stokers and kindred lines, although there is a strong tendency to hold back the placing of contracts.

The Adams Company, Dubuque, Iowa, say that while there has been a falling off on some lines, others have been good. The company have added another size to their line of millers, which they build for iron planers, and are very busy with this entire line.

Bignall & Keeler Mfg. Company, Edwardsville, Ill., makers of pipe threading and cutting machines, advise that during the month of November sales have fallen behind and all machines sold have been of smaller size. All orders

for machines have been sold to supply houses and plumbers. Among sales have been the following: One duplex No. 9 machine, sold by Hill, Clarke & Co., Boston, to a customer at Bangor, Maine; one P. D. Q. C. No. 4 machine to Miller & Brockman, St. Louis, Mo.; one No. 4 machine for R. T. Ford, Rochester, N. Y.; several No. 2 machines have also been sold. Inquiries are quite plentiful and this company find the idea quite prevalent among buyers that prices will shortly be reduced, buying only actual necessities at the present time.

The Philadelphia Machinery Market.

PHILADELPHIA, PA., November 30, 1903.

There has been practically no change of conditions in the Philadelphia machinery market during the past month. Following the usual custom, neither manufacturers nor merchants have looked for any increase in new business; November and December are usually considered off months, and a gradual shading of purchases is anticipated until after the turn of the year. What is interesting them more particularly, is just how much actual business will develop at that time. Under ordinary conditions it is usual for considerable business to be placed early in January, but the present situation is somewhat uncertain. Since the middle of the year purchases of machinery have greatly fallen off, business generally has decreased in nearly all lines, and demand for machinery and tools diminished. Cost of raw material has decreased, and even labor in a number of instances has been willing to accept lower wages. Whether or not the first of the year will show an adjustment of values, so that business may proceed on an even basis, is an open question and one on which opinions differ. Curtailment of expenses is in order in almost every direction, some manufacturers are reducing working hours, others reduce wages, and some find other channels for retrenchment.

Inquiries were somewhat scarce during the early part of the month, but increased during the latter part. No large specifications appear to be on the market, the bulk of inquiry coming from individual concerns and for small quantities. Notwithstanding the number of inquiries, actual business does not appear to materialize; even November inquiries, which in some lines were quite plentiful, have failed to bring the desired orders and seem to bear out the opinion that the market is being felt, rather than that the inquiries are for immediate purchase.

There are still a few plants that can claim to be extremely busy, but even these are not covered for any length of time ahead; manufacturers of locomotives, heavy machinery, engines and large special tools may be included in this class. The majority of plants, however, are now operating on daily orders; some have a month's work ahead, others are covered only for a few weeks. Most all of the medium sized plants can make early deliveries, although shipments of standard tools can be made from stock, which in some lines has become quite large.

The various iron and steel foundries are finding the demand for castings easier; deliveries therefore are more prompt. Some still have a good amount of work on hand. Labor conditions in the foundry trade are generally unsatisfactory, and this, together with the high costs of raw materials at various times during the year, will hardly be conducive to good profits. Prices of castings have in many instances become easier, although no general reduction is announced.

Manufacturers are beginning to look about for export trade, stocks having in some instances accumulated, and it is necessary that a market be found for their goods. Trade abroad, however, is not in the best condition, and does not promise immediate purchases. Prices also will have to work to a lower level before much can be done in that direction, and manufacturers who have been exporting report a weakening demand at this time.

On the Bourse machinery floor dealers in machinery and tools report an unsatisfactory month; practically nothing was done early in the month, but some good sales are said to have been made during the last week, which has given a better average for November business.

The market for the smaller engines, tools, boilers, &c., is quiet, inquiries are fair, but little actual business is being transacted. The demand for machine shop supplies is dull

at this time of the year, buyers taking only such as are needed for immediate requirements.

Prices are nominally unchanged, the leading tool interests having recently confirmed the present figures. While the actual cost of tools now on hand has receded but little, some buyers think that, in the reduced cost of raw materials, probable reduction in wages, &c., lower figures must soon be made. The stock being carried by some manufacturers is also being used as a card for lower prices. Some concessions from list, it is said, are already being made, if necessary to secure the business; meanwhile the leading tool builders continue quoting list prices.

The Earle Gear & Machine Company have established a new plant at Mascher and Oxford streets, for the manufacture of gears and special machinery. Edgar P. Earle, formerly of the Bethlehem Steel Company and the Westinghouse Machine Company, is president; R. J. Snyder, formerly of the Bethlehem Steel Company, is secretary, and Frank D. Hamlin, formerly with the Fawcett Machine Works, is superintendent. Their specialty will be all styles of cut gears, particularly of the larger sizes up to 8 feet, and the designing and building of special machinery and tools of the latest design particularly fitted for the above class of work.

The Philadelphia Pneumatic Tool Company still find a good demand for their various tools. While they have slightly curtailed production, the indications for an early resumption on full time is favorable. The various railroads are among the largest customers at this time, and a large number of tools have recently been shipped for distribution along the lines of the Chicago, Burlington & Quincy Railroad. Pneumatic rammers are being shipped to the far West and exported to Mexico. In order to transact business more expeditiously in that country they have recently appointed Samuel, Hermanos & Canning, Mexico City, Mexico, as their representatives, and a stock of the various lines of pneumatic tools will be carried at that point. Trade with European countries continues satisfactory, a number of tools having recently been shipped to Paris, France, and Milan, Italy, for distribution to the various French and Italian Government Yards. Local and nearby boiler makers continue ordering their tools in small quantities, and numerous shipments have been made on this account.

The Thos. H. Dallett Company, Philadelphia, say the outlook for business has never been more encouraging than the present time. A large number of inquiries are being received from all parts of this country and abroad for their portable electric and rope driven drills, pneumatic hammers, hand drills, stone surfacing machines, carving tools, plug drills, &c., and many large orders have been booked from well-known firms here and on the Continent, among whom are the U. S. Metal & Wrecking Company, New York; Milne & Chalmers, Quincy, Mass.; Robert Wood, Philadelphia; Henry A. Hitner Sons, Philadelphia; Sangamon Coal Company, Springfield, Ill.; Cutter Wood & Stephen Company, Boston, Mass.; Schuchardt & Schutte, Berlin, Germany; Detrick & Harvey Company, Baltimore, Md.; Hudson & Chester Granite Company, Chester, Mass.; Norcross Bros., Worcester, Mass.; Elkurtz & Son, Berwick, Pa., and Charles Sangster, Aberdeen, Scotland, for heavy tools, and in addition are doing a large volume of business in small orders.

I. H. Johnson, Jr., & Co. have taken several nice orders for lathes during the past month, one being for a 54-inch swing, with long bed. The demand, however, is quiet, and business could be much more aggressive. Deliveries of lathes would have been large during November, except for delay in obtaining sufficient motors to equip tools. A number of standard medium and small lathes have, however, been shipped to parties in the Pittsburgh district, to Canada and also to local parties.

The Falkenau-Sinclair Company find a material increase in inquiries for their line of presses and for testing machinery, particularly for cement testing purposes. Orders have been taken for a large special cartridge press for the local United States Government Arsenal and for a quantity of die work. Standard punches and presses of various types have been delivered by them to New York, New Jersey and other local parties. A large vertical testing machine and a cement testing outfit has been delivered the University of Pennsylvania, and a 2000-pound cement testing machine has been furnished the Pennsylvania Railroad Company.

The Philadelphia Roll & Machine Company continue busy. New business at this time usually falls off with them, and this year has proven no exception. Sufficient orders, however, are on hand to run the plant at full capacity for some time. During the past month a number of sand and chilled rolls have been delivered various iron and steel works, also a quantity of heavy special charcoal iron castings. A large shear, 32-inch throat, is also about ready for delivering to nearby parties.

The Tabor Mfg. Company are receiving a large number of inquiries for their molding machines, the past month be-

ing the best in that respect for the past year. Orders also have been very satisfactory. Foreign demand also continues good. Among recent orders was one for two 30-inch square split pattern machines for the American Locomotive Company's Schenectady plant. An export order for two large machines for the London & Northwestern Railway, London, England, has been booked. A number of propositions are also under consideration for the installation in various foundries of large molding machines for tunnel plate work. Deliveries during the month have been extensive and include shipments of standard machines to New England, Western and nearby concerns.

The American Pulley Company find a gradual decline in business as the year draws to a close. Buyers are taking only what is needed for immediate requirements, and not carrying any stocks of pulleys on hand. This condition is apparent in the foreign as well as domestic demand. While deliveries are about as numerous as ever, they are for reduced quantities. Shipments for export continue to Australia and to Continental Europe, while deliveries on orders to the Southern and Western portions of this country are being made about as usual.

The Link-Belt Engineering Company are installing a coal handling plant for Thomas Potter's Sons in this city, and will equip the Chapin-Sack Mfg. Company, Washington, D. C., with a complete plant for handling manufactured ice. The Link-Belt Company continue to receive a fair number of general orders, and their plant continues busy in all departments. Considerable elevating and conveying machinery is in course of construction for export, as well as for domestic coal handling plants. Shipments on account of general orders continue numerous to both local and out of town parties.

The Alfred Box Company, Incorporated, continue busy. A particular demand has developed for large sized hoists, up to 10 tons capacity, and for electric traveling hoists for I-beam service. There is also a fair demand for traveling cranes, several orders for the latter having recently been placed by the Public Service Corporation of New Jersey. Two cranes have lately been shipped for these parties. Two electric jib cranes have been completed for Williamson Bros. Company's foundry in this city. A 20-ton hand power traveling crane has been shipped the Altoona & Logan Valley Electric Railway Company, Altoona, Pa., and the crane and equipment for the Denver, Col., United States Government Mint have been completed and installed.

The Energy Elevator Company continue to do a large business in elevators, particularly of the freight and carriage type. The demand from out of the city is quite as good as the local trade, and during the past month elevators have been shipped to Rome, Ga.; Trenton, N. J.; Toledo, Ohio; Spring Lake, N. J.; Duncannon, Pa.; Lorraine, Ohio; Wilkesbarre, Pa.; Randolph, Va. The third carriage elevator has just been delivered to Cadillac, Mich., parties, the fourth freight elevator to Hamlet, N. C., and the fifth one to parties in Beaumont, Texas. Recent orders have also been received from Farmersville, N. J., and South Bethlehem, Pa., and another lift is to be installed in the local Germantown Hospital.

The Baldwin Locomotive Works continue busy in all departments. Inquiries for locomotives are fair, with a good prospect for some early business. The present output of the plant is the largest in the history of the works. Some additional foreign trade is in prospect, and likely to be closed before long. All the various improvements to their plant which have been under construction during the past year have now been completed and are now in active service. Deliveries of locomotives during the month have again been very large and include, among others, some to the Chicago, Milwaukee & St. Paul Railroad; Chicago & Northwestern; Baltimore & Ohio; Philadelphia & Reading; Pennsylvania and other railroads. Shipments of engines to individual concerns and for mining purposes have also been made.

The Westinghouse Interests.—Office managers of the Westinghouse interests of Pittsburgh, embracing Westinghouse Air Brake Company, Westinghouse Machine Company, Westinghouse Electric & Mfg. Company, and Union Switch & Signal Company, are to assemble this week in Pittsburgh to attend the annual series of meetings which will be held in the general offices of the Westinghouse Electric & Mfg. Company, in East Pittsburgh. The business sessions will be held each afternoon, and on Thursday night the managers will be tendered a banquet by the Westinghouse interests to be held at the Duquesne Club. About 30 managers are expected to be in attendance at these meetings, coming from as far South as Austin, Texas, as far East as Boston, as far West as San Francisco, and as far North as Canada. W. A. Lomoff, of St. Petersburg, who has charge of the business of the Westinghouse interests in Russia, has arrived in Pittsburgh for the purpose of attending these

Economy in Buying, Mixing and Melting Iron.*

BY H. E. FIELD, ANSONIA, CONN.

Economy will be the keynote of industry in the months to come. We have passed through a period during which anything which looked like a foundry could make money. Competition was at its minimum and profits were consequently large. For a time, at least, this condition has changed, and foundries are looking for work where formerly the work was looking for the foundry. With the new condition of things we have more time to consider methods of cheapening production, in order to be able to compete for work and to help out profits. One of the chief items of expense, and in most foundries the largest item, is iron. I cannot hope in one evening to describe what I consider the most economical methods of buying, mixing and melting iron. It would be a subject for a book rather than a paper. I have, therefore, taken at random a point here and there, and have omitted the details whenever possible.

Economy in Buying.

We will consider two subjects under this heading—namely, the method of buying and what to buy.

It is unnecessary for me to point out to this association the advantages of buying by analysis. The disadvantages of the old time method of grading and buying by fracture are so numerous and so well known that they will receive but a word in passing. The chief disadvantages of buying by fracture are the impossibility of defining a grade, the No. 1 of one furnace often being the same as the No. 2 of another; irons of apparently the same appearance as far as fracture goes frequently give entirely different results when used in castings; the buyer by fracture is frequently at the mercy of the makers of certain brands of pig iron. He has always used these brands, and these makers know just what he wants. This founder is unable to take advantage of the lower prices often quoted on other brands. Such periods of shortage of pig iron as that through which we have recently passed cause no end of trouble for such founders. Unable to obtain the brand which he has ordinarily used, and forced to buy anything he can in the shape of pig iron, his iron, as one founder expressed it, has run riot.

Even those who buy on specified analysis have found that this is an insufficient safeguard at such times. This has led some foundrymen to agitate an advanced step in buying by analysis.

At the last meeting of the American Foundrymen's Association in Milwaukee, it was my privilege to present a paper on "Buying Pig Iron on Specification." In this paper I called attention to the fact that at times when the demand exceeded the supply it was impossible for the buyer to obtain the grades or analyses of iron for which he had contracted, especially if the iron was bought at a low price. I called attention to the fact that in the rush for tonnage many furnaces were forced beyond their capacity for making high grade pig iron, and that the foundries were obliged to take this inferior product or go into the market and buy at a greatly increased price, while the furnaces on account of the higher market price were enabled to sell their lower grades for a higher price than they would have obtained under their contract for the higher grade. The founder was often forced to accept the lower grade and inferior castings resulted. As a preventive of such practice I suggested a classification, which should form a part of the contract and guarantee a reduction in price to the founder in proportion to the amount the pig iron fell below the guarantee. This should have two beneficial effects: 1, It should tend to make the furnace live up to the contract, rather than suffer the reduction; 2, it would enable the founder to accept the iron even if it did not come up to specifications, and, with the rebate allowed for this difference, buy special irons to make up the deficiency in quality. If he was forced to use a mixture carrying less scrap on account of inferiority of the pig iron, the reduc-

tion in the price allowed would in part, at least, recompense him for the increase in the cost of the mixture.

At the meeting of the American Society for Testing Materials the Pig Iron Committee, composed largely of pig iron interests, presented a report which classified the different grades according to their silicon and sulphur percentages. At the suggestion of cast iron interests this report was later modified to include a rebate clause for iron not coming up to specifications. The amount of the rebate recommended was not sufficient to be at all effective, but it is of value as showing the tendency in the right direction. In order to make this clause effective and fair to producer and consumer alike the rebate should be just sufficient to bring the price of the iron down to the price of that grade at the time the iron was bought. For example, an iron running from 2.50 to 3 per cent. in silicon is bought at, say, \$16.50 per ton. The price of an iron from 2 to 2.50 per cent. in silicon at that time would be, say, \$16. When the iron was received it is found to analyze 2 per cent. in silicon. The price paid by the founder according to his contract should be \$16, as that is just what he would have had to pay for that grade when he bought the iron. A further clause necessary to make this effective would make the acceptance or rejection of the iron optional with the buyer. When the supply of pig iron exceeds the demand competition will do all that specification will. It is in times when the demand exceeds the supply and when anything in the shape of pig iron commands a high price that we need some guarantee that we will obtain the iron which we bought or its equivalent. Anything which will tend to lessen the troubles endured during the last scramble after pig iron should be welcomed by all foundrymen. This subject warrants the careful attention of all pig iron users.

I wish further to call attention to the fact that considerable

Judgment Should Be Used in Specifying for Iron.

The specifications should be as liberal as possible and yet fulfill the requirements of the buyer. In many instances strict specifications require such extreme care on the part of the furnace that they, in turn, demand a higher price. Some furnacemen will guarantee the complete analysis, some silicon and sulphur only. Brands of iron made in the same district and from the same ores have certain characteristics with which the founder may readily become familiar. By this I mean that the irons run approximately the same in total carbon, manganese and phosphorus. Silicon and sulphur are matters of furnace conditions; phosphorus and manganese are characteristic of pig iron because they are largely due to the ores used. Total carbon, while it is influenced by furnace conditions, is generally constant for a certain grade of a given brand. A well-known brand of pig iron, for instance, never exceeds 0.5 in phosphorus, runs between 0.4 and 0.6 in manganese, and always exceeds 3.65 in total carbon. This furnace if asked to guarantee these amounts would want a prohibitory price for the iron. It will, however, guarantee the silicon and sulphur within fairly close limits. Another equally well known iron runs identically the same in phosphorus and manganese, but never exceeds 3.30 in total carbon. The makers absolutely refuse, however, to guarantee this total carbon. Other irons are equally characteristic in phosphorus and manganese and carbon, so that the founder after becoming familiar with the composition of the different brands can generally obtain the composition that he desires when the silicon and sulphur only are guaranteed.

Pig irons in certain districts have characteristics due to the kind of ore most economical in their locality. All Lake Superior irons run low in phosphorus and high in carbon. A majority of the Pennsylvania and Ohio irons run the same. Virginia irons are high in manganese with widely varying phosphorus. Alabama irons are higher in phosphorus and low in manganese, although there are some marked exceptions in that district.

To buy economically, then, we should buy by analysis, with specified rebates if the iron is not up to the guarantee. We should buy intelligently, asking no impossibilities of the furnace. We should make use of a knowl-

* Abstract of paper read before the Pittsburgh Foundrymen's Association, November 2, 1903.

edge of the general characteristics of the brands in choosing those best suited for our work.

Factors Determining the Most Economical Brands.

In considering what to buy, there are four factors which determine the most economical brands to buy—namely, 1, Local conditions; 2, suitability as to composition; 3, uniformity; and, 4, economy in handling and melting.

The available supply and price of scrap are local conditions, which determine what kinds of iron are the most economical. If the price of scrap is low in comparison to the price of pig iron iron should be bought which when mixed with that scrap would give the required composition in the casting. If, however, the price of the scrap iron is high, it is frequently more economical to buy pig iron of a composition nearer to that required. A foundry in one district may carry 75 per cent. of scrap in their mixture, while another in a different part of the country melting with 50 per cent. of scrap may be using as great economy when the prices of scrap and pig iron in the two districts are considered. I know of a locality where a No. 1 machinery scrap frequently equals or exceeds the price of a No. 2 pig iron. The founders have come to believe that scrap is an absolute necessity to their mixtures, and the demand is so great that the high prices result. Higher silicon and low sulphur iron must be bought if much scrap is to be used. If comparatively small amounts of scrap are used a low silicon and high sulphur iron may be bought at a saving in price of the pig iron. An hour's time spent in such calculation before purchasing iron may frequently result in a saving of from 50 cents to \$2 per ton in the mixture.

The second factor in deciding what iron to buy is its suitability as to composition. The cost being the same, it is advisable to secure irons that are as near as possible to the composition required. This avoids the care necessary in mixing grades of iron of varying composition. The practice of buying odd lots of iron wholly unsuited for the work simply because they are cheap is economical only in so far as such irons can be mixed with irons having the properties which this iron lacks and the mixture of the two be less in price than a single brand suited for the work. This does not by any means signify that a buyer should not always hold himself in readiness to buy at a bargain such lots as are occasionally offered. If such iron is offered, the founder should immediately determine what sort of an iron would be necessary to mix with that iron to bring it to the required composition. Its price should be obtained, and if a mixture of the two can be made economically the lot should be bought.

Several factors must be considered in determining what irons are best suited for a certain grade of work. Generally speaking, the softest iron which will give the required strength is the most economical. There are instances, however, where the weight is so large in proportion to the cost of machining that a few hours' extra machine work can be paid for many times by using a cheaper iron. Foundry and cupola conditions vary so much in different foundries that the composition best suited for one foundry will not do at all for another.

It is advisable, then, to select irons which will produce a mixture of such composition as will most economically combine economy in price of mixture with economy in machining under the conditions in vogue.

The third property to be considered in determining what to buy is uniformity. There is a considerable variation in a single car of some grades of pig iron; this is due to the fact that there is a variation in a single cast from the blast furnace, and also to the methods of grading at the furnaces. This variation has been largely overcome by the use of the casting machine. The iron is tapped from the furnace into ladles and there becomes well mixed before being poured into the iron molds of the machine. Each cast thus represents a car of uniform iron. The advent of machine cast iron into foundry practice has been an event of no small moment. Its value will be more and more appreciated as it becomes more generally used.

The shape and condition of the pigs as they come to

the founder are important factors in the cost of handling and melting the iron. While the large, unwieldy pigs formerly shipped to the founder are now seldom seen, many furnaces still send out iron, the extra cost of handling and melting of which is no small item. The heavy weight and rough shape of the pigs make them difficult to handle, while the excess of sand which they carry is a dead loss to the founder. If it is charged into the cupola heat must be furnished to melt it. The allowance generally made for sand is not sufficient to overcome the amount usually found on the outside of the pigs. Here again we see the advantages of machine cast pig iron; you pay for iron, not sand; you do not have to charge a large amount of sand into your cupola which must be melted and kept fluid. Dr. Richard Moldenke has presented a paper before this association proving that the higher combined carbon irons have a lower melting point. This would indicate that there was a saving of fuel in melting the machine cast iron over the sand cast, owing to this higher combined carbon. It is difficult to determine just what difference in price this variation in the condition of the iron makes; it is safe, however, even with our present knowledge to choose at an equivalent price the sandless pig over the sand cast, of the same composition.

Economy in Mixing.

Mixing economically and mixing by analysis are synonymous, providing the latter is carried on intelligently and under favorable conditions. There is no division of foundry practice where greater economy can be maintained than in the mixing of the iron. I may also state that there is no division where a saving shows less than right here. At the end of a week, a month, or a year, you can foot up the cost of your molding, your core making, your cleaning or your general expenses and compare them with previous records. It is different with your iron; the great fluctuation in the price prevents such comparisons. If the cost of the iron per pound for the year is low, it is generally laid to the low price of iron. I believe that a saving of \$1 per ton in the cost of a mixture would not be appreciated in one foundry in a hundred unless attention was called to it at the time the saving was made. There are many foundries to-day melting from 5000 to 50,000 tons of iron in a year in which a saving of from 50 cents to \$2 per ton could be made by an intelligent application of chemistry to the mixture of their iron.

A saving in the cost of the mixture is but one of the many economies accomplished by the use of analysis in melting. We assume at the outset that the mixing is in the hands of one who is competent to use analysis intelligently. Foundry chemistry has not as yet reached perfection so far as its general application is concerned. This has been largely due to the fact that the opportunities for perfecting one's self in this branch of foundry practice have been limited.

This problem of foundry economy is not easily solved. Several of our technical institutions have foundries and are supposed to give instruction in the metallurgy of iron. These courses have not been a success as far as practical results go. The number of students nominating such courses has not warranted the expense necessary for proper instruction. Such instruction as has been attempted has been so limited as to be of little practical value. It will be the privilege of the Pittsburgh foundrymen to so advise those in control of the new institute to be established in your city that this state of affairs may be overcome. The foundrymen of the country are looking to this institute for a course which will fill a long felt want along this line. They hope to see the theoretical and practical combined in such instruction as will at the graduates for positions in their foundries which now remain unfilled.

Economy in Melting.

The location and arrangement of the foundry and the amount of iron melted determine what is the most economical method of handling iron. A traveling crane covering the pig iron yard is advantageous when the yard and cupolas are properly arranged and when the

amount of iron handled is sufficient to warrant the expense. The use of crane scales allows the charge to be made up in the yard, the traveler moving from pile to pile until the whole charge is complete. When the iron is properly arranged in the yard this is a rapid and satisfactory method. If each load is made to represent a charge, the confusion of mixing and weighing on the cupola platform is avoided. If the building is so arranged that the traveler can place its charge upon the cupola platform, there is no need of an expensive elevator.

Foundries built with their pig iron yard on a level with their cupola platform will not benefit as much by the traveling crane; neither will those who unload their pig iron and coke directly into storehouses forming a part of the platform. In such cases the weighing car is more economical; each load of the car should constitute one charge. When the charge is made up it is taken to a convenient spot where a hoist lifts the charge from the scale car, placing it upon another car, and the weighing car returns to make up the next charge. Both of these devices prevent a rehandling of the iron in weighing and avoid expensive charging platforms. When the crane is used no tracks are needed and the iron is piled solid in the yard. When the cars are used more room is needed for piling, tracks must be laid and an elevator built.

It is not economical, however, for small foundries melting light heats to expend large sums for such mechanical devices. If one man does all the cupola work, from chipping out to charging and tapping out, it would hardly be economy to spend a large sum on improvements in order to give him time to smoke his pipe for half of the day. I do assert, however, that many of our methods of handling and charging are antiquated, expensive and inaccurate. This department has been neglected in many foundries which are wholly up to date in other matters.

Two foundries—one with every modern equipment for charging, melting and casting; the other with its old style cupola and poor methods of handling and pouring—will not secure the same results at an equal outlay for iron. The modern plant, with its conveyances by which the melted iron may be placed at the side of the mold ready for casting in a few seconds, is one problem; the old arrangement, whereby it takes half an hour to get from the spout to the casting, is another. In the second case the iron must be enough hotter and contain elements which will give it additional fluidity to last the difference in time. This means that more fuel must be used in the second case than in the first, and consequently a greater absorption of sulphur by the iron. This absorption must be counteracted either by using a lower percentage of scrap, and thus reducing the sulphur, or by using higher silicon iron to offset the action of the sulphur. Both mean an addition in cost of the mixture. In order to obtain the same fluidity a higher phosphorus iron would have to be used in the second instance. High phosphorus would mean weakness, and in many cases segregation and spongy spots.

There are two methods of comparing the cost of the mixture. One is based upon the daily charging sheet, where all scrap, shop as well as foreign, is rated at the same price, and the other is to figure from the amount of material bought. In the latter case the home scrap is rated at exact cost. Figuring on the former basis one foundry may be apparently doing better than another, yet in reality the cost of the mixture may be higher. This difference would be due to the amount of scrap runners and pig beds returned from the day's melt. This in many shops is figured as scrap, and figured at the price of bought scrap, when in reality it may be a great deal better and much more of it can be used in proportion to the amount of pig.

Two foundries running on the same grade of work will vary in the amount of iron remelted as runners, pig beds, &c. This is due to the fact that in some foundries great care is taken in figuring the weight of the castings and the amount of iron to be taken for that casting. Others take 3 or 4 tons extra to pour a 10-ton casting, and have pig beds all over their shop which must be re-

melted as scrap. There is a leak at this point in many foundries, and if your iron costs are unaccountably large this is a good place to look for a reason.

The Cupola.

The cupola itself is a factor in melting economy often neglected. An old cupola is not necessarily a poor cupola. There are some ideas which have been introduced into modern cupola practice which can be advantageously applied to our old cupolas. The methods in vogue in a certain foundry determine to a large extent the best practice for that foundry. There are some foundries where the molding stops when the wind goes on. In such cases small, slow melting cupolas, with poor devices for handling the melted iron, are a burden which should be replaced by large, rapid melting cupolas with modern appliances. Even in those foundries where the molding continues after casting begins, the interruptions and confusion inseparable with casting prevent as much work being done. The large, rapid melting cupolas allow the commencement of casting to be delayed, so that one or two hours' molding per day for each molder may often be gained. This is a saving worth considering, and it has been actually accomplished by many foundries who have increased their cupola capacity per hour either by the installment of larger cupolas or by putting in additional cupolas, together with the necessary appliances for handling the iron. The increased cost due to the slight extra expense in melting is many times repaid by the extra amount of work obtained per day.

There has been so much written about melting ratios and the construction of cupolas that this subject will be passed with the remark that, where conditions are favorable, low tuyere cupolas are the most economical. Cupola practice varies so much that information in regard to size of tuyeres, amount and pressure of blast, &c., is reliable only when applied to a particular instance. In looking into the subject for my own use I have found that the low ratio melters use duller iron. This does not always mean poor castings, as many of them have quick appliances for handling which enable them to cast while another founder is thinking of it. Many use higher phosphorus iron, which enables them to get sounder castings with dull iron and light work. This has led me to believe that there is more truth in some of the fanciful figures advanced than I once believed possible.

There is one more economy in melting which modern practice has accomplished—namely, the substitution of the cupola for the air furnace in the manufacture of so-called high strength iron. It was formerly thought that it was necessary to melt iron for such work in an air furnace. With the advent of chemistry into foundry practice came the knowledge that the strength of an iron was dependent upon its chemical composition, and that it was possible to duplicate air furnace iron in composition and strength from the cupola. It is much cheaper to melt iron in a cupola, and I have found it much more satisfactory. The cupola is much less affected by weather conditions, and as a general thing cheaper irons can be used in a cupola than it is possible to use in an air furnace and obtain the same results. The air furnace is still a valuable adjunct, especially in old foundries. The peculiar conditions surrounding that branch of founding make its use there profitable. I am aware that many will take exceptions to my references to the air furnace. I have used both the air furnace and the cupola for Government work on gun carriages and the like, and have found that it is much easier and cheaper to meet the Government requirements as to strength, &c., with cupola iron than it is with iron melted in an air furnace. A complete and thorough knowledge of the metallurgy of iron, of cupola changes and of the composition which will give the required strength in different thicknesses of castings is essential to make this possible.

The reversing engine which the William Tod Company of Youngstown, Ohio, have about ready for shipment to the Alabama Steel & Wire Company, Gadsden, Ala., is a three-bearing bored guide reversing engine, with cylinders 48 inches in diameter and 60-inch stroke. The total shipping weight of the engine will be 300 tons.

HARDWARE.

FEW things have come home to the jobbing trade in the last few months more forcibly than the necessity of conservative action in prices for the year 1904, so as to show a satisfactory profit. Every thoughtful jobber has come to the realization that the making of money is the prime object for which he is in business, and that selling a lot of goods and swelling sales may look very well, but at the end of the year when the books are balanced it becomes clearly apparent that it is better to pass business than to take it at no profit, and to this complexion the trade is fast coming. Scarcely any jobbers have been so wise or so self centered as not to have been more or less affected by the prevailing rush and glamour of good times, so that the average house has found itself more widely extended than is either wise or safe, and there has grown up a habit among many jobbers of increasing their sales at the expense of profit. One source of profit—viz., speculation in staples, because of the appreciation in price—has practically passed away, and instead there is the reverse to be faced, that of a certainty of more or less loss by depreciation in price of stock on hand because of the inevitable drop in prices which faces us. The demand is slackening up and promises to continue to decrease for a time at least.

In a well regulated business it is frequently possible to increase the sales without a corresponding increase in the percentage of expenses, but the business is not so constituted that a falling off in sales is accompanied by a corresponding decrease in percentage of cost of doing business. There are a great many theories of economy, but no house yet has succeeded in cutting down its expense account in proportion to its loss of sales. It is apparent, then, that the percentage of profit on goods sold should be increased unless narrowed margins or even an actual loss is to result. This naturally calls for the putting away of senseless competition, of pushing the goods that are not profitable, of the exploiting of sales in territories which are so remote or so sparsely settled that they never can be profitable, and the getting down to the matter of fact problem of doing business on a profitable basis.

It is one of the healthy signs of the time that this feeling is widespread and is being put into practical effect. It must be remembered that everything connected with jobbing expenses has shown a steady increase for many months, and among other things, salaries, wages, price of material and traveling expenses have imperceptibly grown in volume and no way has been found to keep them down. The problem which is seriously arresting the attention of every thoughtful jobber of the day is the necessity of selling his goods at a profit which shall at least cover the increased cost of doing business.

The announcement in another column in regard to the action taken by the Washington Hardware Association subdividing the State territorially so as to have local associations which will hold separate meetings and have their own organization, but all in connection with the State association, will be regarded with special attention by all interested in retail organization. Many of the States are of such extent that it is difficult to secure a full representation of the trade at the meetings, because such meetings, wherever held, must be comparatively inaccessible to many of the members. The project of having smaller sectional associations seems to be an admirable solution of the problem, which would have the further advantage of cultivating a fraternal spirit and permitting frequent

meetings, while at the same time the local association would have more unity of interest in many matters coming before it. The experiment made by the progressive State of Washington will be watched with interest, and meanwhile it will be wise for those identified with the retail movement in other States to consider what action should be taken by them to meet similar conditions.

Condition of Trade.

The market shows the effect of the trade's entrance on the closing month of the year. One feature which is obvious is the fact that the finishing touches are being given to preparation for the winter and holiday trade. Orders for classes of goods immediately concerned are being received in goodly number by jobbers and manufacturers, but these in many cases are for small quantities to supplement earlier purchases, or to cover the requirements of tardy buyers, whose needs are naturally quite limited. There is also a very satisfactory demand for small quantities of miscellaneous goods to replenish broken stocks. There is, however, a good deal of caution shown in avoiding overbuying, partly on account of the near approach of the end of the year, when a large proportion of the merchants take stock, and partly in view of the weakness which is apparent in the market. The latter consideration has much influence with the large houses, who are buying very conservatively notwithstanding the fact that they are able to report that business has been and continues to be remarkably good, with the prospect of a satisfactory volume next year. The fact of gradually declining prices is being generally accepted, but its influence is to induce frequent purchases for moderate quantities rather than a cessation of buying, which with existing general conditions and active business would be a very unwise policy. Both jobbers and retailers recognize the wisdom of keeping stocks in good shape. While the era of speculation has passed there is little reason to doubt that business will be active as a result of the underlying prosperity and purchasing power of the masses of the people in practically every section of the country. The condition of the market will for a time, no doubt, interfere with building and other large projects, as those who have them in contemplation will naturally wait until a more settled basis of price is reached. The unreasonableness of labor's demands, too, has a mischievous influence in this direction. This curtailment of enterprise will while it lasts limit the purchasing power of the workmen directly affected, but in a great many departments of trade there is promise of a satisfactory demand and good business. The increase of the outgo into foreign lands of manufactured products in Hardware and related branches of the trade is a very gratifying feature. There is little doubt that the relief the market will thus experience will have a healthy effect upon it

Chicago.

Hardware business continues to be good. Holiday goods are moving satisfactorily, and the demand for the better grades of goods is notable. Builders' Hardware seems to be in active demand, the trade being spread generally throughout the West and Northwest. Cold weather goods are responding admirably to the fall of the mercury. Skates are particularly active. A peculiar feature of the Shovel business is that the disruption of the Shovel association, instead of demoralizing prices, has stiffened rates particularly on the cheaper grades, which all manufacturers formerly sold at a loss. Wire Nails are quiet, and there is little doubt that the leading producer is making prices 5 to 10 cents below card rates where necessary to secure desirable business. Cut Nails are only moder-

ately active and the price is being maintained. Smooth and Barbed Wire are generally held at the old prices, though shading is indulged in in some instances. The second cut of a $\frac{1}{2}$ cent per pound on Sheet Zinc within the last 20 days has taken place, making prices a full cent a pound less than they were about the 10th of the month. Sheet Zinc is now being sold from stock, Chicago, on the basis of \$5.95 per 100 pounds for 9 and 12 gauge 12 to 36 inches wide in 600-pound casks, with the usual advance on smaller casks. This is on the basis of \$5.75 to the jobber at the mill.

Boston.

BIGELOW & DOWSE COMPANY.—Cold weather makes a lively demand for Skates, Sleds, Stoves, Snow Shovels and other seasonable goods. Winter weather coming so early insures a large sale that will tax the factories for capacity, and should produce a scarcity as the season progresses.

The demand for Christmas novelties promises a large sale. In General Hardware, there is a good volume of orders. The few declines have been promptly met by the jobbers, who can see the necessity of lower prices in some lines of Hardware. The general feeling is that it is better that these declines come now before the spring purchases are made, thus insuring a staple market and giving confidence to the buyer.

In December and January it is time to receive inquiries for carloads of Nails and Fence Wire. When bottom is reached these orders will be placed. Many jobbers have customers who depend upon them for advice when it is time to buy, as it is all important to the country merchant to have his spring stock at the lowest market cash. Nails are now bought only for immediate want, but the time is not far distant when it will be safe to buy car lots.

Louisville.

BELKNAP HARDWARE & MFG. COMPANY.—The market still continues to settle, notwithstanding a very good demand for material of all kinds and more or less vague assurances of having reached rock bottom, hard pan, &c.

Building, to be sure, is somewhat restricted by labor disputes, and fears of them when the work is once under way, but this is no more marked than in many previous periods, possibly not as much so. If persisted in, however, its results are likely to be far reaching. It must be patent to the labor leaders themselves that they are shaking confidence and breeding timidity of capital. Money, instead of expanding and passing from hand to hand, will be hoarded again, and very good wages, which are prevalent now, will of necessity be reduced, or in some branches cut off altogether. It does not look to us like a favorable time for unusual agitation of that nature.

The continued depreciation of industrial stocks has almost ceased to excite comment. Any day in which there is not a slump from two to five points is rather exceptional. Confidence of the whole investing community has been shaken in the "high financiers" and their associates or would-be imitators. It appears in the revelations of the shipbuilding trust that those who sat highest in the seats of the mighty, of the steel company even, instead of being engaged in developing their great properties and in arranging to serve their customers, as was promised at the outset, with more dispatch and accuracy, and in dividing the saving which was reasonably expected by this large combination, were simply engaged in artificially inflating or deflating values for their own benefit in the stock market. Certainly that company even now are not yet a homogeneous one who persist in advertising one brand of their own make of sheets, for example, as far superior to all other brands. It looks as though at the outset disintegration were contemplated at the close of the present period, and that special brands belonging to the constituent company, advertised at the expense of the whole company, would eventually get the sole benefit. It is a good sign, however, that the offices are to be grouped further West—viz., in Pittsburgh. The big, black cinder piles around the mills and the grimy atmosphere of that center of Steel industry must be more natural and congenial to

some people, who were to this manner born, than the breezy upper stories overlooking Battery Park and Hudson River. A great saving can unquestionably be effected in the offices, and when those whose minds are on mill output and not on the tape are bent on making this saving and really work to the end of insuring their stockholders an usufruct, we shall believe that bull points on Steel have come to stay.

It is a sad story, taking it all in all, of betrayal of the solid, substantial industry into the hands of speculators, who cared nothing for the traditions and honor of the business established through a century of individual struggle and national protection, but only for feathering their own nests while there was anything left to pluck.

We hope that the next chapter will tell more of virtue and of high commercial honor, and not be confined to the toboggan for its illustrations, a chapter of which the trade may be proud. As it is, those of us on the outside feel chagrined and mortified at the disrepute into which the very names of Iron and Steel have been brought.

Cleveland.

THE W. BINGHAM COMPANY.—We have nothing special to report at this time. The Hardware jobbers in this district are all busy. Our customers are sending in by mail and through our salesmen a good volume of orders. We are all especially busy at this time sending forward holiday goods to our customers, as the jobbers in this district carry a large and varied line of this class of goods. We have had a very large trade on Coal Hods, Elbows, Stove Boards, Gas and Oil Heating Stoves, Fire Shovels, Hand Sleds, Meat Cutters and Stuffers, and many other lines of fall goods. Many of our customers are now sorting up these lines freely, having sold out their first, or stock, orders, and we are having a large business in Skates, Snow Shovels and Scrapers. Indications are that this will be a big year for the sale of Skates, especially on the better grades, as the prices on them are low. General trade in all lines is quite satisfactory; also collections.

It is said that money talks. Well, if this be true, certainly Cleveland's prosperity is assured for some time to come, as from a statement issued by one of the national banks, the deposits of the National, State and savings banks of Cleveland aggregate \$180,000,000, and this is nearly 40 per cent. of the aggregate deposits in the State of Ohio. This statement of itself shows that Cleveland is a busy and very prosperous community, and we, in this neck of the woods, are proud to know that our citizens have been able to accumulate and place to their credit for interest and future business use such a fair amount of money.

Portland, Oregon.

CORBETT, FAILING & ROBERTSON.—The French bark "Jollette" gave us a fine example of what ship subsidy does for ship owners, at the expense of tax payers, the past week. She sailed from Australia in ballast, entered the Columbia River, and finding charters were demoralized, cleared again in ballast for Australia, as subsidy runs for miles sailed, whether or no she carries cargo.

In three days last week 17 vessels, carrying 35,000 tons of cargoes, valued at \$850,000, cleared from our port outward bound—a good showing considering so little wheat is moving. There are still 33 vessels in port with carrying capacity for 50,000 tons.

A log of Oregon fir, or pine, as it is sometimes called, 28 feet long, 8 feet 6 inches at butt, and 8 feet at small end, that scales 12,000 feet board measure, and one of 17 logs that scaled 40,000 feet, from a tree that was 200 feet to first limb, has been secured for the Oregon exhibit at the St. Louis Exposition. No wonder Michigan and Wisconsin timbermen are after our timberlands!

Trade is normal considering the season, although prices are badly demoralized. Situated, as we are, so far from the market, where it takes three to five weeks to get carloads through, or 60 to 90 days around Cape Horn, we are forced to carry large stocks, and when the market is weak we are all out to sell.

Nashville.

GRAY & DUDLEY HARDWARE COMPANY.—The volume of business continues to be extremely heavy; we must confess that we are a little surprised at this, as we had not expected trade to continue quite so good. November sales show an increase of about 20 per cent. over last November. The South seems to be enjoying an unusual amount of prosperity; especially in the cotton section is this so. All of the salesmen who travel in cotton growing sections have had the biggest fall and winter business in their lives, and it continues to keep up without any sign of diminishing. A slight reduction in the prices of Nails, Bolts, Hinges and a few other staple goods seems to have had almost a stimulating effect, as the movement of these lines has been very heavy. A tremendous business still continues in all kinds of holiday goods. A great many country merchants, who laid in their supply of Christmas things in September and October are reordering, and the volume of the holiday business will be the largest ever known in this part of the country. We are also glad to say that collections keep pace with the sales.

Philadelphia.

SUPPLER HARDWARE COMPANY.—The cold weather that we have had for the past two weeks, and especially during the past ten days, has stimulated the purchases of the retail trade on seasonable goods, and on these lines there is quite an active demand at the present writing.

In our last letter to *The Iron Age*, under date of November 19, we stated:

The meeting of the National Hardware Association, as well as the meeting of the American Hardware Manufacturers' Association, during the days of November 18 to 20, inclusive, will give an opportunity for both the jobbers and manufacturers to consult and confer upon matters, and possibly an opinion expressed after that meeting would be of more value than an opinion expressed at this writing.

With the extensive circulation of *The Iron Age*, it naturally reaches the hands of thousands of those interested in Hardware, and perhaps that paper never contained more interesting matter than could be found in its pages during the past two weeks, giving full details of the proceedings to the two conventions referred to.

R. A. Kirk, the retiring president of the National Hardware Association, after referring to the remarkable depreciation in the stock market, which had perhaps never before been equalled, further stated:

Yet our great manufacturing and commercial interests have gone steadily along. Speculation and inflation had run their maddening pace and the day of reckoning came, but the channels of legitimate business have not been greatly disturbed. Aside from speculation there have been also other harmful influences that have come in and have interfered largely with the regular currents of business. Among these baneful factors it is safe to say that labor troubles have done more to disturb and impede the progress of the country in material improvement during the past year than all other causes combined. This condition of things is greatly to be deplored, and in our opinion the time has come when the business interests of the country must necessarily take a more active part in efforts to prevent these great disturbances and the tremendous losses entailed by them. There is surely some practical way in which employer and employee, capital and labor, can be brought to work together for their mutual good, and that will render strikes and boycotts harmless and impossible.

Referring to the above, it is to be regretted that business has been subject to such conditions as referred to by Mr. Kirk. It was the opinion expressed at the convention that had these conditions not existed during the past six months it would have been found there would have been no diminishing of trade or in the output of iron and steel products. That certainly was deplorable to learn.

W. M. Pratt read a paper before the American Hardware Manufacturers' Association, in which he stated:

There is a good deal of truth in the old adage—that we find about what we are looking for. If we come to our conventions looking for knowledge and ideas we shall find both. . . . It is useless for us to come here and

put on a false mask, spend our time in flattery, and when we have returned home do things with an entirely different face. . . . If we have a grievance, state it; don't put a cloak around it and cover it up with something else.

Referring to the above, would say, we believe these are the two conditions both organizations adhered to during the conventions, consequently a good deal of valuable information from both associations was gained which we feel will be of value in the future.

There was practically no pessimistic feeling in regard to the future; all agreed that the curtailment in the output of pig iron and structural iron was largely caused by what was referred to in Mr. Kirk's address, but large orders have recently been received for these lines for foreign shipments. There has been considerable criticism from the fact that orders have been taken for export for these goods at a less price than established prices for our own home markets. This fact has not been denied or disguised. On one side condemnation may be given for this act, and on the other side great praise may be given. Even though manufacturers have sustained what might be looked upon as a loss they have been able to keep their works running full force and turning out goods at a less price than if they had been working only on part time. Besides it has kept many thousands of men and boys in employment, which would not have been the case had there been a shut down. The old question, therefore, naturally comes to the front, should there be a reduction in the tariff on these products? On this there is and always will be a difference of opinion; but when we look at the fact that even with our present tariff it is stated that the expenditures will be \$5,000,000 greater than the receipts for the month of October, and that for the first six months of the fiscal year—namely, from July 1, 1903, to January 1, 1904—the deficit shown by the books of the Treasury Department will probably reach some \$12,000,000, the question is would it be better to tax our own products and therefore receive a larger amount for internal revenue or receive it from imports. Mr. Chamberlain, in urging upon England a tariff, said:

Some years ago in England it was the argument that the United States, being an agricultural nation, might rightfully expect to export food products and raw material, whereas England would manufacture this raw material, and thus supply the markets of the world.

That was an ideal conception at the time, but at the present time it is possible for us to be the largest exporters of manufactured goods in the world, and it is further possible for this to continue unless hampered by conditions that exist within our own country. Our manufacturers pay the largest wages paid in any country in the world, our wage earners have better homes, their tables are better supplied, their wearing apparel far in advance of any other country and their opportunities for the education of their children unequalled anywhere. This is made possible by improved machinery, intelligent workmen and our ability to produce more in a given period with the same number of workmen. But those who are looked upon as leaders of trade organizations should master the situation, look on both sides of the question and advise those who depend upon them accordingly. We believe that is possible to accomplish, and if it is done good results will be secured.

There was little display at the conventions of any pessimistic feeling in regard to the immediate future of the Hardware trade. The price of General Hardware is not high. While there may be some slight changes in values or readjustments in prices January 1 by manufacturers of Hardware, it is not believed that any large contract was unawarded because of the price of General Hardware, nor could any private enterprises be named that would have gone forward had the price of General Hardware been less. It is not believed that the wage earners have refused to purchase Tools owing to the fact of their present value or cost. It is a well-known fact that our agricultural products are of very large volume this year. The output of cotton from the Southern States and the prices realized for it place these people in an excellent position for trade, so that throughout the West and the South the prospects for the coming year continue bright.

NOTES ON PRICES.

Wire Nails.—Orders are, to a great extent, for small lots, amounting to a moderate demand. The market is fairly firm at the following quotations, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carload lots.....	\$1.90
Retailers, carload lots.....	1.95
Retailers, less than carload lots.....	2.05

New York.—Demand for small lots from store comprises the bulk of business at this point. Quotations are as follows: Single carloads, \$2.10; small lots from store, \$2.15 to \$2.20.

Chicago, by Telegraph.—The competitive price on Wire Nails may be said to be \$2.05, Chicago, to jobbers in carload lots. Retailers can buy Wire Nails at from \$2.10 to \$2.15 in carload lots, Chicago, with 10 cents advance for less than car lots. A feature in the Wire Nail business is the competition of the Coated Nail, which is sold here at about 10 cents per keg less than the regular Nails.

Pittsburgh.—There is a fairly active demand for Wire Nails, considering the season of the year, and shipments for the mills are quite large, but mostly for carloads and less quantities, jobbers continuing the policy of placing orders only for actual requirements. Concessions in official prices are being made quite freely, and range from 5 to 10 cents a keg for carloads and larger lots. Prices of Wire Nails are \$1.90 in carloads to jobbers, \$1.95 in carloads to retailers, and \$2.05 to \$2.10 in small lots, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days. For galvanizing Nails 75 cents per keg is charged, and for tinning Nails \$1.50 a keg extra.

Cut Nails.—The regular monthly meeting of the Cut Nail Association was postponed from the last week in November to the second week in December. The market is firm, while demand continues moderate. Quotations are as follows: \$1.90, base, in carloads, and \$1.95 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms, 60 days, less 2 per cent. off in 10 days.

New York.—There is a steady but moderate demand for small lots from store. Quotations are as follows: Carloads on dock, \$2.04½; less than carloads on dock, \$2.12½; small lots from store, \$2.20.

Chicago, by Telegraph.—Cut Nails seem to be held firmly at \$2.05, Chicago, but the demand is only moderate. At even prices the Wire Nail seems to have the advantage in popularity.

Pittsburgh.—Buyers continue to place orders for Cut Nails only in small lots for actual needs. As yet there is no disposition shown to place contracts ahead. We quote: Steel Cut Nails, \$1.90, base, in carloads and \$1.95 in less than carloads; Iron Cut Nails, \$2, base, in carloads and \$2.05 in less than carloads, plus freight in Tube Rate Book to point of destination, 60 days, less 2 per cent. off in 10 days.

Barb Wire.—A light demand for small lots characterizes the market, orders being restricted to immediate requirements. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots.....	\$2.20	\$2.50
Retailers, carload lots.....	2.25	2.55
Retailers, less than carload lots.....	2.35	2.65

Chicago, by Telegraph.—Barb Wire manufacturers and jobbers claim that the November just closed was a good average month, and that the prospects for the coming season are favorable. The leading producer continues to quote to jobbers, Chicago, \$2.45 for Painted and \$2.75 for Galvanized; 5 to 10 cents higher to retailers, and an advance of 10 to 15 cents in less than carload lots. But buyers claim that prices ruling 10 cents lower are freely quoted by competitive interests and are met by the leading producer. Staples in carload lots sell as follows: Plain, \$2.30 to \$2.35, and Galvanized, \$2.70 to \$2.75, the outside price being to retailers.

Pittsburgh.—Demand for Barb Wire is light and for small lots only for actual requirements. The trade is usually dull at this season of the year, and the present

light demand is therefore not exceptional. Concessions in prices ranging from 5 to 10 cents per hundred pounds at mill are being made. We quote as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots.....	\$2.20	\$2.50
Retailers, carload lots.....	2.25	2.55
Retailers, less than carload lots.....	2.35	2.65

Smooth Fence Wire.—Free buying by the trade continues, resulting in quite a heavy demand. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....	\$1.80
Retailers, carloads.....	1.85
Less than carloads.....	1.95

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	6 to 9	10	11	12	12½	13	14	15	16
Annealed.....Base.	\$0.05	.10	.15	.25	.35	.45	.55		
Galvanized.....	\$0.30	.35	.40	.45	.55	.65	1.05	1.15	

Chicago, by Telegraph.—This commodity retains its wonted strength, and specifications on contracts are being quite freely made. Official prices remain as follows: Nos. 6 to 9, \$2.05 to \$2.10 in carloads on track, and \$2.15 to \$2.20 in less than carload lots from store; Galvanized, 30 cents extra for Nos. 6 to 14, and 60 cents extra for Nos. 15 and 16.

Pittsburgh.—Demand is fairly active, and most of the mills are quite busy. Concessions in prices ranging from \$1 to \$2 per ton are being made. We quote as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days: Plain Wire, \$1.80, base, for Nos. 6 to 9 in carloads to jobbers, \$1.85 in carloads to retailers and \$1.95 in small lots to retailers; Galvanized, 30 cents extra for Nos. 6 to 14, and 60 cents extra for Nos. 15 and 16.

Sheet Zinc.—Another reduction in the price of Sheet Zinc is announced under date November 27 by Matthiessen & Hegeler Zinc Company, La Salle, Ill. The price is now \$5.75 per 100 pounds in 600-pound casks, subject to the usual discounts in quantities.

Conductor Pipe, Eave Trough, &c.—Under date of November 24, 1903, the manufacturers of Galvanized Conductor Pipe, Eave Trough, &c., announced a reduction in prices amounting to about 10 or 12 per cent. There were also some changes made in the territorial arrangement. We give below the territorial divisions as amended, together with the discounts to dealers for less than carload lots; terms, 60 days, or 2 per cent. discount for cash in 10 days from date of shipment:

Eastern Territory.—Section A.

New England, New York, Pennsylvania, New Jersey, Delaware, Maryland, Ohio (except Cincinnati), parts of Virginia and West Virginia lying north of a line drawn from Newport News, Va., and following the Chesapeake & Ohio Railroad through Richmond, Lynchburg and Clifton Forge, Va., to Huntington, W. Va., on the Ohio River.

Conductor Pipe, nested.....	75 and 7½ %
Conductor Pipe, not nested.....	75 and 2½ %
Eave Trough.....	80 and 10 %

Eastern Territory.—Section B.

Indiana, Illinois, Michigan, Wisconsin and the city of Cincinnati, Ohio.

Conductor Pipe, nested.....	75 and 10 and 2½ %
Conductor Pipe, not nested.....	75 and 7½ %
Eave Trough.....	80 and 10 and 5 %

Central Territory.

North Carolina and that part of Virginia and West Virginia lying south of the Chesapeake & Ohio Railroad; Kentucky, Tennessee, Missouri, Iowa and that part of Minnesota lying south of the line of railroad running from Sioux Falls, S. D., to Duluth, and all of Wisconsin except Milwaukee; also the Northern Peninsula of Michigan and Charleston, S. C., and Savannah, Ga.

Conductor Pipe, nested.....	75 and 7½ %
Conductor Pipe, not nested.....	75 %
Eave Trough.....	80 and 10 %

Southern Territory.

Mississippi, Alabama, Georgia, Florida and South Carolina except the cities of Charleston and Savannah, which are placed in Central Territory.

Conductor Pipe, nested.....	70 and 10 %
Conductor Pipe, not nested.....	70 and 5 %
Eave Trough.....	75 and 16½ %

Southwestern Territory.

Louisiana, Arkansas and Texas.

Conductor Pipe, nested.....70 and 7½ %

Conductor Pipe, not nested.....70 and 2½ %

Eave Trough.....75 and 10 and 5 %

Notes.

Texas, common point freight to be allowed on all shipments to Texas and New Orleans.

Nebraska, Kansas, Oklahoma and Indian Territory take Central Territory discounts but with freight allowed only to the Missouri River.

The territory lying west of these lines takes the nearest territory discounts.

Freight to boundary lines only allowed. The cities on boundary lines take discounts ruling in territory receiving the lower prices.

Shovels and Spades.—The dissolution of the Shovel Association has not thus far resulted in any material change in prices. The market is well sustained at about the same level as when the association was in existence. This level on the common goods, which are most widely sold, is so low as not to give much opportunity for further reductions. A good deal of interest at this time centers in the question as to the reception the jobbers are giving to the proposition made them by the leading interest, with contract which would restrict them from buying from other manufacturers. There seems to be a hesitancy on the part of a good many houses to do this, although the obtaining of a rebate is conditional upon their so doing. The trade in general are placing orders with caution, as they are not sure what the course of the market will be, but there is more confidence that prices of this line will be quite well maintained than there was a few weeks ago.

Wire Rope.—The market for Wire Rope continues uneven, as some of the manufacturers continue to quote less than the regular prices.

Sash Weights.—There is little ground for complaint in regard to the Sash Weight market in the East, where prices are pretty well maintained, but there continues to be a good deal of irregularity in the West. The competition between the manufacturers has been very animated, and as a result prices are forced down to a low level, sometimes touching \$20, though higher prices are frequently named. Jobbers' quotations are correspondingly low, in sympathy with the disturbed market. Business is still in fair volume and stocks are low.

Cordage.—Manufacturers are experiencing a steady demand, but of considerably smaller proportions than during the busy season. There is a noticeable increase in the number of manufacturers who are putting out mixed Manila Rope, owing to the fact, probably, that competition has demanded it. Quotations for this grade of Rope are from ½ to 1 cent below that of Pure Manila. Quotations, on the basis of 7-16 inch diameter and larger, are as follows: Pure Manila, 11½ cents; second-grade Manila, ½ to 1 cent per pound lower; Pure Sisal, 9¼ cents; Mixed Sisal, 8¼ cents per pound.

Glass.—Reports indicate that the formation of the Manufacturers' Window Glass Company is progressing favorably. The object of the proposed company is to form a central selling agency, which shall control the Window Glass output of the United States. To make this agreement operative signatures of manufacturers representing 1500 pots must be secured before the 10th of this month. For carloads, it is understood, manufacturers are quoting jobbers 90 per cent. discount from manufacturers' list; and that jobbers are quoting the trade 89 and 5 per cent. discount from the same list for car lots. Local jobbers are quoting small lots at 90 and 10 to 90 and 20 from list of December, 1902, as they do not recognize the October, 1903, list.

Oils.—*Linseed Oil.*—Business is light and confined to small lots. The market is quite firm at the following quotations: City Raw, in lots of five barrels or more, 37 cents; in lots of less than five barrels, 38 cents per gallon. Out of town and Western Oil is quoted at 35 to 36 cents per gallon.

Spirits Turpentine.—Various substitutes for Turpentine are reported as being used by consumers, owing to the high prices of the genuine article. The substitutes include benzine and various mixtures of Turpentine and benzine. The substitutes are sold at a considerable re-

duction on prices of the pure article. The market for Spirits Turpentine is quiet, but steady at the following quotations, according to quantity: Oil barrels, 59 to 59½ cents; machine barrels, 59½ to 60 cents per gallon.

WASHINGTON HARDWARE ASSOCIATION.

ONE of the most important subjects discussed at the annual meeting of the Washington Hardware Association, to which reference was made in our last issue, was the attendance of members at the yearly gatherings. It was recognized, however, that many firms were situated so far from the place of meeting that their presence there was difficult, if not impracticable. Accordingly, it was proposed to form local associations in different sections of the State, as follows: Northwestern, with headquarters at Whatcom; Central West, with headquarters at Seattle or Tacoma; Southwestern, with headquarters at Olympia, Northeastern, with headquarters at Spokane, Southeastern, with headquarters at Walla Walla; Central East, with headquarters at North Yakima; Columbia River, with headquarters at Wenatchee.

It is designed to have a vice-president and secretary for each section, and the divisional organization will work under the direction and in conjunction with the State association. In this way questions of interest can be discussed at the frequent meetings at the different headquarters and suitable action taken, or if necessary, referred to the state officers.

TENGWALL LOOSE LEAF DEVICES.

THE TENGWALL FILE & LEDGER COMPANY, Ravenswood station, Chicago, Ill., are manufacturers of the Tengwall file and ledger loose leaf devices. They also publish "Tengwall Talk," a periodical issued in the interest of their business. This form of catalogue is coming more and more into general use, the rapidity of business changes compelling the adoption of such a system to keep, conveniently and inexpensively, the trade literature of manufacturers and merchants up to date. With this system as soon as a page becomes obsolete it can be replaced with a new one, or new ones added, without defacing or injuring the book or its appearance. This style of book is also made for pocket memoranda. The Tengwall loose leaf catalogue covers are in various styles and shapes, according to the size and weight of the catalogue to be fitted. For a large, heavy catalogue style C is recommended. This cover is made with two telescoping posts, which allow an expansion of about 75 per cent. The back is made of metal in widths of 1, 2, 2½, 3, 3½ and 4 inches. The cover is fitted with a double, direct action screw, which opens and closes very rapidly, holding the sheets as in a vise. The book is solid and flat—opening without any roll—removable index leaves being furnished when desired. Style B Tengwall cover is made with two posts, outside thumb screws and telescoping back, while style A is made with a flexible leather back allowing about 25 per cent. expansion, and outside thumb screws for opening and closing. All of these covers are made in various width backs of varying thickness. The covers, which are very strong and durable, are bound in cloth, leather or canvas in almost any color desired.

UNDER date 16th ult., Garland Nut & Rivet Company, general offices Frick Building, Pittsburgh, issue a circular in which a view is presented of their new plant at West Pittsburgh. This plant has been fully equipped with the most up to date Rivet and cold punched Nut machinery. On Rivets from ⅝ inch diameter down to a 4-ounce Rivet they have a large productive capacity. They carry a large and well assorted stock, and being centrally located and with a choice of five railroads, which run directly into their works, they are in a position to guarantee quick delivery. They enumerate the various styles of Nuts and Rivets which they are prepared to furnish, and make any style of head. Robert Garland, who is widely known to the trade, is president of the company.

Should Hardware Manufacturers Sell to Other than Legitimate Hardware Jobbers?

THE subject of Hardware manufacturers selling to other than legitimate Hardware jobbers came up for considerable discussion at the recent Atlantic City conventions of the manufacturers' and jobbers' associations. It is a topic of a good deal of interest to the trade generally, and the views of retail merchants on the question will be of interest. We accordingly make the following extracts from letters from this class of the trade which have recently come to hand:

Manufacturers Should Be Permitted to Sell the Larger Retailers, Says an Ohio Merchant:

For quite a number of years I have bought the greater part of my goods—in fact, I think three-fourths of all my purchases—from the manufacturers.

There are a number of reasons—viz., the goods are usually in neater packages, cleaner, more merchantable and are sure to be of one grade and one make. As to price, while the jobber may have occasionally a special price, on the average from year to year I think the price the manufacturer gives me is on the whole a trifle better. However, I find

Better Than the Jobbers' Price

that I prefer to get my goods direct. And so for these reasons I am of the opinion that the manufacturer should be permitted to sell to others than the legitimate jobbers—viz., larger retailers. But I think he should not under any circumstances sell to a catalogue house nor to a consumer unless he advise his

No Sales to Catalogue Houses or Consumers

And should I be one of his customers I could be very easily persuaded (for my health) to find another place to buy my goods.

A Wisconsin Merchant Recommends Protection for the Jobber:

If the jobber cannot consume the output of the manufacturer he ought not to complain if the manufacturer goes outside for a market for his product. If a manufacturer does sell to others than the regular jobber he ought to do so at an advanced price; in other words, protect the jobber. The jobber should strive to handle all this business even at a small margin.

A Merchant in Michigan Says Volume of Business and Quantity Should Decide:

This is a deep question and one which admits of discussion from several standpoints. The question of what constitutes a legitimate Hardware jobber to some extent governs the answer to the entire question.

As I understand the term, a legitimate Hardware jobber is one who sells only at wholesale—to the retail dealers. Using this definition for a Hardware jobber we have very, very few of them in the United States. My opinion is that the Hardware manufacturer is justified and should sell to any dealer who is prepared to buy in quantities sufficient to make a shipment from the factory. As a matter of fact, in many lines of goods there are retail dealers who consume much larger quantities than do the jobbers. There has been a disposition on the

Crushing Out the Large Retailer

part of self styled Hardware jobbers to crush out the large retailer. Many of those taking an active part in this work against the retail dealer are jobbers who do not, in the course of a year, handle any more business than do many retailers. To me it would seem that volume of business should regulate the dealings with the manufacturer, rather than the fact of any firm's name being on a certain jobbers' list, so-called. This work of the Hardware jobber in the effort to crush out the retailer seems to me to be very much the same effort as is being made by labor unions in their own behalf.

Jobber a Necessity to the Retailer, Says a New England Hardwareman:

Should Hardware manufacturers sell to other than legitimate Hardware jobbers? My reply would always be, No. My reason is that the jobber always has been and always will be a necessity to the retail dealer, and such being the case it is no more than right that we should give all of our business to them, or if for any reason we do buy direct from the manufacturers, it should be at the same price as we have to pay to the jobber.

The manufacturers should investigate and know more about some of the dealers to whom they sell who claim to be jobbers, but are such only in name, as supplying them at jobbers' prices they are in a position to undersell their neighbor and thus cause trouble for the regular retail dealer.

Better That the Manufacturer and Retailer Be in Close Touch, An Eastern Dealer's View:

Speaking for ourselves, would say that while we maintain a retail department, the bulk of our business is in Heavy Hardware and Mill Supplies, selling direct to the manufacturers. Our purchases in this line are large enough to entitle us to be classed as jobbers, so far as Heavy Hardware and Mill Supplies are concerned; so, in spite of the fact that we do some retail business, we feel that we are entitled to buy from the manufacturer direct as low as the so-called legitimate jobber. In the matter

A Matter of Location

of Shelf Hardware, it seems to us that many times it would be a matter of location. Houses that are located a long way from the manufacturer and are near to the jobber would find it hardly practical to buy direct from the factory, as they could save time by buying from the nearby jobber, and in many cases would secure better prices from the jobber than they would from the factory, as many jobbers are willing to divide with the retailer the last quantity discount, which the retailer could not obtain from the factory, as he would not be able to buy the quantity. On the other hand, where a retailer is located very near the manufacturer it would be many times to his advantage to be able to secure goods direct from the manufacturer, thereby saving valuable time.

In the matter of figuring on contracts for trimming private houses and public buildings, it is almost essential that the retailer in many cases be at liberty to call upon the manufacturer for his valuable assistance in consummating a deal of this nature.

Figuring Building Contracts

Where it is practical to call upon the manufacturer in a case of this kind to come upon the scene with a full line of samples, the transaction, particularly if it is a large one, is rendered much easier of solution than it would be at the hands of a jobber. A representative of a factory calling with a full line of samples simplifies the condition very materially.

There are many ways of looking at this subject, and much may be said, both for and against the practice, but on the whole we are inclined to think that in the majority of cases all sides interested are better served if the manufacturer and the retailer are in close touch with each other.

Wisconsin Merchant Refers to the Introduction of New Goods:

I presume by jobbers you mean those who sell to the retail trade. If a manufacturer waited until the jobber called for his goods, I think he would wait a long time before they would come into general use, but think it only fair for the manufacturer to protect the jobber in a quantity price. Having been on the road some 20 years, have seen a great many specialties introduced that have since become staples and are carried in stock by all Hardware jobbers.

Manufacturer May Sell His Goods Anywhere, Says a Connecticut Merchant:

Replying to the question, Should Hardware manufacturers sell to other than legitimate Hardware jobbers? allow me to say I do not speak from any selfish motive in the matter when I answer, Yes. They should sell to

whoever wishes to buy of them. The jobber has no more staunch supporter than the writer, and I believe that he should always have a margin of profit beyond the price to any retail dealer. If a retail dealer prefers to buy from the manufacturer, the manufacturer certainly cannot refuse to sell him. I will say candidly that should one of them refuse to sell his goods to the writer, I would not buy his goods of a jobber, but I would not claim the jobber's price.

A manufacturer has the right to sell his goods whenever he pleases, but I do believe that he should be very careful about the price he makes. Certainly if he sells a retailer at as low a price as he does the jobber, he is doing wrong.

A Michigan Merchant's Brief But Significant Comment:

I would simply say, let manufacturers take care of themselves. Everything in this universe finds its level; so will a level headed producer find the right way to the consumer (through the retailer).

A Pennsylvania House Are Sceptical as to the Existence of "Legitimate Jobbers":

If legitimate jobbers could be found—by this we mean those who would not sell goods to any one but dealers—and would avoid quoting or furnishing goods to consumers, we would be gratified to have manufacturers stick closely to this class of people; but regret to state that we have no knowledge of such, and can truly state also that the only competition which we have comes from the jobbers. In view of this fact, we would state most emphatically

Large Retailers and Manufacturers in Closer Touch that the large retailers are in duty bound to take care of themselves, and from our observation this class of retailers and the manufacturers are in closer touch with each other to-day than ever before, and we are not in any case compelled to buy goods from jobbers, and when we are, our business will be for sale.

Jobbers Cannot Do All the Business, Declares a Michigan Correspondent:

Should Hardware manufacturers sell to other than legitimate Hardware jobbers? Yes, why not? Jobbers we will always have, we must have them, and we appreciate the place they fill in trade. The jobber is the retailer's best friend, but the jobbers cannot do all the business; cannot please all or reach every one satisfactorily. Consequently the manufacturer must help them out.

We are all more or less selfish. The manufacturer wants to sell to the jobber and retailer; the jobber would like to sell to the retailer and consumer, and the retailer would like to buy of both manufacturer and jobber.

Let All Follow Their Bent He can sell to the consumer only. Let them all follow their bent, and all who are in favor of letting the manufacturer sell to the retailer say "aye." The "ayes" have it.

Views of a Missouri Merchant:

Should Hardware manufacturers sell to other than legitimate Hardware jobbers is a question so perplexing to answer that one might be pardoned for ducking. It requires broad treatment to justify the position of the three interests involved: 1, The manufacturer; 2, the jobber; 3, the retailer.

Their interests are identical; they should be in perfect harmony. The three make the arch of business method, and I am strongly of the opinion that the jobber is the keystone of the arch. It does not seem possible in the conduct of my own business, with a stock running from \$17,000 to \$22,000, to do without the jobber, and I cannot conceive how the small retailer, with one-tenth of my stock, could get along at all without him. Conceding this much, yet candor

compels me to say that under present conditions we could not make a success of our business could we not purchase certain lines direct from the manufacturer. Exclusive lines are the profitable lines, and profit is the anchor of business success. The jobber recognizes this

Anchor of Business Success fact; hence the special brands, trade-marks and exclusive designs that encompass his business. It is well known that first-class

articles without any restrictions will be shelved by the dealer, because, without restrictions, the article will not pay as large a profit as the other "just as good." Now this explanation does not answer the question, and only serves to show the difficulties of answering it, because the consuming public have rights also that must be respected.

To judge which course for us all to pursue is a delicate one. The manufacturer must live; therefore must dispose of his product at a profit. The jobber, who distributes in small quantities to the retailer, has the same right. The retailer, in turn, who meets

A Delicate Question the consumer face to face, has also the desire to live, and lastly, the consumer, the final arbiter, won't stand for any injustice.

A little tact, a little unselfishness, would remove a great deal of the cause of this discussion.

I do not believe any jobber has ever criticised us in the conduct of our business, and we never have objected to criticism. One large jobbing house have a number of special brand goods, and they strive to protect several retailers in each town by selling them different lines. Yet that does not always avoid trouble, because suburban town merchants seem to take delight in cutting prices on identical brands.

I do not feel that I am prejudiced when I say that I really believe the retailer is entitled to the greatest charity from the manufacturer

Consideration for the Retailer and jobber for several reasons:

1. Immeasurably larger number.
2. Because, as spokesman for both the foregoing before the jury of the consuming public, he has the hardest battle to fight.
3. Because combinations and agreements between jobbers are much easier to effect.
4. That manufacturers have combined in a very arbitrary and harsh manner to dictate to both jobber and retailer.

DEATH OF ANTHONY S. MORSS.

ANTHONY S. MORSS, for 60 years a Hardware merchant in Boston, Mass., died at his home in Charlestown, Saturday, November 21. Mr. Morss was a native of Newburyport, Mass., where he was born in 1823. Immediately after graduating at the Newburyport High School, at the age of 13, he entered a Hardware store as a clerk, working as a subordinate for eight years, until 1843, when he went to Boston and established a store of his own at 210 and 212 Commercial street, remaining in business at this stand until his death. He was the first Boston dealer to take up the specialty of Yacht Chandlery and Trimmings, and his success showed his shrewd business insight. He was a member of the New England Hardware Dealers' Association and for a time was vice-president of that organization. For 50 years Mr. Morss was a member and most of the time an officer of the First Parish Congregational Church of Charlestown. He was a State prison inspector under appointment by Governor Andrew, and ever after took a great interest in the welfare of discharged convicts, and was for a long time vice-president of the Massachusetts Society for Aiding Discharged Convicts. He held many positions of public trust during his long life.

REEVES & Co., INCORPORATED, manufacturers of Engines, Threshers and other Agricultural Machinery, Columbus, Ind., will remove their branch house at Springfield, Ill., to Peoria, Ill., at which headquarters all Illinois trade will be handled.

NATIONAL ENAMELING & STAMPING COMPANY'S NEW CATALOGUES.

THE NATIONAL ENAMELING & STAMPING COMPANY, 81-83 Fulton street, New York, have just issued two new catalogues of their products. Catalogue No. 4 contains 391 pages of Kitchen Utensils and kindred articles other than Enameled Steel Ware, manufactured at plants variously located at Milwaukee, Brooklyn, Baltimore, New Orleans and Berlin, L. I. This company also have their own rolling mills at Granite City, Ill., and tin plate mills at St. Louis, enabling them to produce their line from the pig iron up, with still other factories at St. Louis, Portland, Conn., and Bellaire, Ohio. Catalogue No. 5, in its 126 pages, covers Enameled Steel Ware in various styles and qualities. Particular attention is called to their one coated line of Gray Mottled Ware, known as Royal Granite Steel Ware and Venetian Enameled Steel Ware, which has a triple coating of pure white inside with a coat of the wavy effect in either dark blue or turquoise blue enamel on the outside. In addition they manufacture Granite Steel Ware, Blue and White and White and White Ware. Catalogue No. 5 has a cover in *fac-simile* of the mottling on their Royal ware, giving also a reproduction of the label used on the ware. The back cover is a representation of a sheet of steel in its original shape.

TRADE ITEMS.

ABRAM COX STOVE COMPANY, Philadelphia, announce that the fire which occurred in their plant on the night of the 25th ult. has not interrupted their business. Through the heroic efforts of their employees and the efficient service of the fire department the fire was restricted to one part of their plant, and all departments resumed work as usual.

H. F. NEUMEYER, Macungie, Pa., has taken a partner into his business and the style has been changed to the Macungie Brass & Mfg. Company. The firm are about to occupy their new factory, where Mr. Neumeyer's line, the manufacture of Nozzles, Couplings, Lawn Sprinklers, Ball Cocks and Closet Valves, will be continued with greatly increased capacity. A large and commodious foundry will also be occupied and the new firm will be prepared to furnish all grades and weights of castings in copper, bronze and brass.

AMERICAN WRINGER COMPANY advise us that they are receiving a great many requests for souvenirs in consequence of the publication in our columns of a report that such were given out by them at Atlantic City, when in fact the company did not give out any. This statement will set them right with any of their friends who might feel slighted if they seemed to be neglected in this matter.

At the recent annual meeting of the National Association of Wagon Manufacturers held at the Auditorium Hotel, Chicago, the following officers were elected for the ensuing year: President, Theo. D. Gere, Champion Wagon Company, Owego, N. Y.; first vice-president, E. Louis Kuhns, Studebaker Bros. Mfg. Company, South Bend, Ind.; second vice-president, W. K. Shelly, Tiffin Wagon Company, Tiffin, Ohio; secretary and treasurer, H. W. Suydam, Milburn Wagon Company, Toledo, Ohio; Executive Committee, Frank L. Mitchell, Mitchell & Lewis Company, Limited, Racine, Wis.; Richard Carpenter, Indiana Wagon Company, Lafayette, Ind.; C. A. Geiger, Troy Wagon Works Company, Troy, Ohio.

D. P. HALE, who has for the past six years represented the J. Stevens Arms & Tool Company, Chicopee Falls, Mass., has resigned, as his manufacturing and banking interests at Sandersville, Ga., require more of his attention than he has heretofore been able to give them. He will be succeeded by Charles E. Roberts, who has for the past five years been connected with the Winchester Repeating Arms Company, New Haven, Conn., representing them on the road during the last two years. Mr. Roberts will have entire charge of the territory south of the Ohio River and as far west as Texas.

GEORGE H. BROWN, for a number of years New York

manager of the Gilbert & Bennett Mfg. Company, has resigned his position on account of ill health. He has been succeeded by Edward F. Jones, a director of the company, and for a number of years their New England representative.

THE growth of the business in this territory of the Whitman & Barnes Mfg. Company has led them to increase the stocks of goods at their branch house, 111 Chambers street, New York. This will enable them to handle business with greater promptness. They have put in Drill cabinets of oak natural finish, of very large capacity for holding full lines of all styles of Drills, Straight and Taper Shank, Jobbers' Wire Gauge and Blacksmiths' Drills and Countersinks; also all kinds of Reamers and a complete line of Taps.

P. & F. CORBIN, New Britain, Conn., have hung in their office pictures of a number of their employees who have been identified with the plant for 30 years or more. The dean of the aggregation is F. S. Heidecker, whose service with the company began in May, 1853. Henry Gussman is but two years his junior in point of service. Altogether there are 21 men whose term of employment with the company exceeds 30 years.

HENRY DISSTON & SONS, Philadelphia, Pa., have recently made up on order crosscut saws said to be the longest ever turned out for actual use. They are intended for California timber, the gigantic proportions of which require extremely long saws. The saws in question are 16 feet long, or more than twice the length of the ordinary crosscut, and the making required exceptional facilities. Crosscut saws 12 and 14 feet long are not unusual with the Disstons, and the foregoing illustrates their ability to meet even exceptional demands in the saw line.

SNELL MFG. COMPANY, Fiskdale, Mass., who have recently had some difficulty with their workmen, now report everything in most satisfactory shape. The better class of their employees have seen their mistake, and are surrendering their union cards and agreeing to ignore labor organizations in the future. The company are keeping all the men engaged, while their polishers were out on strike, and are only taking back the most efficient and desirable workmen. During the strike labor leaders from other cities visited Fiskdale, and did all in their power to keep the men out, but the promised help of \$7 a week failed to materialize and the workmen became dissatisfied and expressed themselves eager to return to work.

HARDWARE MUTUAL FIRE INSURANCE IN MINNESOTA.

M. S. MATHEWS, Boston Block, Minneapolis, secretary of the Retail Hardware Dealers' Mutual Fire Insurance Company of Minnesota, under date of November 1, issues a condensed statement of the business of the company up to that time. The statement shows that since January 1, 1900, when the company began business, the total premiums have been \$67,093.89. The total losses during the same period have been \$16,545.23, or 24 per cent.; the total expense, \$9218.88, 14 per cent., and the total losses and expense combined, \$25,763.45, 38 per cent. For the ten months of the present year to the 1st ult. the gross premiums were \$26,421.34; gross losses, \$5153.89; gross expense, \$2815.94.

GUARANTEE ON CHAINS FOR BICYCLES, ETC.

THE following form of guarantee has been adopted by American manufacturers of Chains for Bicycles, Motor Cycles and Automobiles:

We will replace such Chains as in our judgment show defects in workmanship or material, provided same are returned to us for inspection, transportation charges prepaid.

We agree to prepay return transportation charges to consignor on all replacements.

On account of the various conditions under which Chains are used and cared for we cannot guarantee the certain performance of any Chain, and will not replace Chains or parts which have been used. Customers should inspect Chains as soon as received and report any supposed defects or complaints before returning same.

AMONG THE HARDWARE TRADE.

Holland-Schad Hardware Company have succeeded G. W. Holland & Co. in the wholesale and retail business in Shelf and Heavy Hardware, Stoves, Tinware and Sporting Goods, Wymore, Neb.

M. W. Canfield, Toledo, Ohio, who for the past three years has been conducting business under the style of Canfield Hardware Company, has disposed of his store and stock to Campbell & Cramer, who continue at the old stand.

Stilwell & Ricker, Carrollton, Mo., have been succeeded by Rucker & Son, who will continue the retail Hardware business at the old stand.

Hunt Bros. have lately entered the Hardware and Paint business in Campbell, Neb.

E. A. Shaw has purchased the Hardware, Stove and furniture business of F. B. Myers & Co., Rippey, Iowa.

O. M. Dunham Company, Long Beach, Cal., have been incorporated with a capital stock of \$25,000, and the following officers: O. M. Dunham, president; N. R. Richardson, vice-president, and S. E. Barker, secretary. The company will handle at retail Builders' Hardware, Paints, Oils, Varnishes, Wall Paper, Sash, Doors, &c.

V. W. Harris, Anthon, Iowa, has disposed of his General Hardware business to John W. Haase.

Porter Bros. have succeeded Mason & Porter Bros. in the Hardware, Stove and Agricultural Implement business in Altoona, Iowa. The firm have lately moved into a new store, the main floor of which is 40 x 70 feet, with 13-foot ceiling. They continue to occupy the old quarters, devoting them to their stock of Implements.

Lemen & Skelton have purchased the Hardware business formerly conducted by Coe & McMillen, Monticello, Ill.

FLOYD & BOHR, manufacturers of Saddlery and Harness, and jobbers of Saddlery, Hardware and leather, Louisville, Ky., have purchased the business of the Rankins-Snyder Hardware Company of that city, and will continue this line in connection with their manufacturing and jobbing Saddlery and Harness business. Messrs. Rankins and Snyder will have an interest in the business. With the need of larger quarters, Floyd & Bohr have removed to the establishment formerly occupied by the Hart Hardware Company, 750-758 West Main street. This is a commodious building, five stories high with basement, and is equipped with all modern appliances for carrying on the Hardware business.

BUTLER BROS., Chicago, issue four booklets, entitled "The Goods We Sell," "The Practical Catalogue," "Why We Can Undersell" and "The Short and Simple Story," which are interesting and to the point. The last mentioned gives the experience of a Hardware merchant who several years ago branched out into other lines which are being increasingly taken up by the trade. It is needless to say that the experience, as related, was a very gratifying one. This booklet also calls attention to some of the lines which come in nicely for sale in connection with Hardware, including Wooden Ware, Baskets, Brushes, Sewing Machines, Baby Carriages, Glassware, Crockery, China, Lamp Goods, Trunks and Bags, Metal Beds, Horse Goods, Optical Goods, Whips, Musical Instruments, Toys, &c.

THE MALLETT HARDWARE COMPANY, New Haven, Conn., have sold their retail hardware business at 861 Chapel street to John E. Bassett & Co. of that city, who have closed out by special sale the greater part of the stock of Tools and Cutlery. The remainder of the stock, together with other goods, has been removed to the Bassett establishment.

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FACTORY COST AND BUSINESS METHODS.

SELF PROVING COST SYSTEM OF BRIDGEPORT BRASS COMPANY.

BY GUY P. MILLER.

Fifth Article.

The preceding articles in this series described the organization of the factory and many of the details of its Cost System. In the following columns we continue the description, showing the form of Indirect Labor Cards and the manner in which the various elements of cost are brought together and charged against the various Departments, Standing Order numbers, &c.

CARDS FOR EXPENSE
OF INDIRECT LABOR.

Expense or Indirect Labor Cards, Fig. 36, are the same color (white) for all departments. All labor not charged to Production Orders is charged from Expense Cards to either Plant or Standing Order numbers. The total charges to Production, Plant and Standing Orders are balanced weekly with the pay roll, which, like a trial balance, proves the accuracy of the posting by the cost

MAR. NO.		DEPARTMENT		DATE		EXPENSE																																																																																																									
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Fig. 36.—General Expense Card Covering Labor Not Charged to Production Orders. Size of Slip, 4 by 6 Inches.

clerks, and insures getting into the costs the entire expenditure for labor. Each foreman has a copy of the Standing Order numbers with explanation of items that should be charged to each number, and, as these numbers once established are not changed, the entire list is soon memorized.

SYSTEM OF STANDING ORDER NUMBERS.

The Standing Order numbers are arranged in groups as follows:

<i>Permanent Investment</i>	0- 99
<i>Repairs and Care of Plant</i>	500-599
<i>Power, Heat and Light</i>	600-670
<i>Superintendence</i>	670-700
<i>Indirect Labor</i>	700-850

The number of Standing Order numbers has been increased from time to time as demands were made for more detailed information.

SUBDIVISION OF STANDING ORDER NUMBERS.

The following list of Standing Order numbers under the group Repairs and Care of Plant illustrates the method of subdividing groups to order numbers:

Repairs and Care of Plant.....500-599

- 501. **Repairs, Land:**
Repairs Sewers, Pavements, Grading, &c.
- 510. **Repairs, Buildings:**
Repairs, Fences, Chimneys, &c.
- 520. **Repairs, Machinery:**
Repairs Machinery, Countershafting and Belts for Main Shaft of Main Plant, Presses, Lathes, Drill Beds, Punch and Die Holders, &c.
- 521. **Repairs, Power, Heat, Light and Protective:**
Repairs Power, Heat, Light and Protective, such as Engines and Pumps, Gas Piping, Electric Wiring. Including Oiling Machinery.
- 522. **Repairs, Machinery Accessory Tools, such as Chucks, Lathe Tools, Special Arbors, Drills, Taps, Threading Dies, Boring Bars, &c.**
- 523. **Repairs, Rolls:**
Includes replacing broken Rolls.
- 525. **Changes and Alterations to Machinery and Tools.**
- 530. **Repairs, Office Furniture and Fixtures:**
Repairs Cabinets, Cupboards, Desks, Tables, &c., for old offices.
- 535. **Repairs, General Fixtures:**
Repairs Factory Furniture and Fixtures, such as Benches, Storage Racks, Bins, Pickle Tubs, Desks, Cupboards, Reel Stands, Roll Benches, Partitions, Saw Horses, Time Clocks, Shelves, Tote Boxes, Trucks, Annealing Pans, Mold Racks, &c.
- 537. **Repairs, Furnaces:**
Repairs Muffles and Furnaces.
- 540. **Repairs, Hand Tools:**
Repairs Cold Chisels, Hammers, Files, Tongs, Stirrers, Pokers, Hand Shears, Cutting Pliers, Crowbars, Hand Scratchers, Wrenches, &c.
- 541. **Repairs, Molds and Dies:**
Repairs Flat Metal, Tube and Rod, Molds, Drawing, Dies for Wire and Tubing, Also Cupping, Stamping, Blanking and Drawing Tools.

May 1903.	Week ending	Carl Hansen	W. H. for W. 29	O. H. for W. 30	O. H. for W. 31	W. 31	W. 31	W. 31
May 2		12 38				26 00		12
" 9		19 79	22			24 60		25
" 16		17 98	17 1/2			12 30		30
" 23		21 69	1 13		30	11 08		25
" 30		14 48			33	27 70		28
Totals		88 72	307		63	101 68		115

Fig. 37.—Manner in Which Indirect Labor is Charged from Labor Cards to Standing Order Numbers and Subdivided to the Various Departments. Size of Sheet, 24 by 10 Inches.

542. Repairs, Patterns:

Repairs Wood and Metal Patterns.

543. Repairs, Drawings:

Repairs.

550. Repairs, Outside Real Estate.

ASSEMBLING COSTS
OF INDIRECT LABOR.

Costs of Indirect Labor are accumulated from the labor cards on sheets 24 inches long by 10 inches wide, Fig. 37. These sheets are ruled and cross ruled, and headings

Plant Order No. 990	To Department 21	Date of order June 20/03
Please execute the following order, returning the order on completion of the work to the Superintendent. Charge all material and labor to the above plant order number. Work to be done for \$0.520... Department 33... Date completed June 28/03		
Repair Power Press #320		
Out of alignment		
To be completed by date as below. June 29/03		
Approved B. L. L.		Sup.

Fig. 38.—Plant Order for Repairs. Size of Slip, 4 by 6 Inches.

are filled in as desired. A separate sheet is used for each Standing Order number, the columns being headed with department numbers. Expense Labor Cards are sorted and posted weekly to these sheets, the labor being charged to the department for which it is performed. Fig. 37 shows charges by expense departments (O. D.) to various subsidiary departments of the Manufacturing Departments for repairing machinery, Standing Order No. 520.

CHARGING EXPENSE
OF VARIOUS DEPARTMENTS.

Under the heading "General Unclassified" are posted expense charges of expense departments that cannot be charged to any one of the production departments, but must be proportioned, including such expense as foremen,

Dept. 30				Dept. 33			
S.O. No.	Charge	Supp.	Charge	S.O. No.	Charge	Supp.	Charge
20				20		26.82	117.72
22		65		22		6.46	1.37
35				1.63	35	2.10	39
40				40			5.25
41		12.59		1.45	41	219.40	25.03
42				42			
501				501			
510		2.17		2.02	510	17.81	
520		63		3.66	520	1.15	101.68
		63				1.15	1.26

Fig. 40.—Manner in Which Indirect Labor Charges to the Different Standing Order Numbers Are Grouped to Departments. Size of Sheet, 24 by 10 Inches.

sweepers, &c. Although the amount of the charges under this heading appear large, Fig. 37, they are very small in proportion to the total expense charges to all of the subsidiary Manufacturing Departments. The illustration shows the total weekly charge to Manufacturing Departments for repairing machinery under "General Unclassified," but only a small proportion of the total charge to all manufacturing departments direct, or only to Departments 29, 30 and 33. Charges to other departments would be entered on part of the sheet not shown in cut. Under heading "O. D. for D. 29" are posted expense charges by other departments (O. D.) for repairing machinery for

that department. Under heading "Department 33" are posted charges of Department 33 to itself, on account of repairing machinery in that department by employees in the department. Repairs made for Department 33 by other departments appear under caption "O. D. for Department 33."

USE AND FORM
OF PLANT ORDERS.

Plant Orders, Fig. 38, are issued for all expense work where the amount expended is \$25 or over, and for all jobs where costs are wanted, as for new machinery, tools and dies. These are issued in duplicate by the Cost Department on request of the superintendent. The original is sent to the department that is to do the work and the duplicate kept on file. Charges of expense labor are posted weekly from Labor Cards, the form of which is shown in Fig. 36, to the back of Plant Orders, the face of which is shown in Fig. 38 and the back in Fig. 39. Fig. 36 shows Labor Card of Herbert Burr, who worked four and three-quarter hours on June 25 repairing machine No. 320 for Department 33 on account of Plant Order 990.

Material	Value	Labor	Hours	Value
June 6th Cast Iron	3.00	June 25 Repairing	7	2.10
			20	6.00
Factory Expense @ 25%				2.02
Total Material	3.00	Total Labor and Factory Expense		11.12
For S. O. #520		Aggregate		10.43

Fig. 39.—Back of Plant Order, with Charges Against Standing Order No. 520 for Labor and Material.

This card, Fig. 36, is arranged to make the least amount of clerical work for the workman. The most frequent expense operations are listed at the right of the card, the

workman making a check mark, V, opposite the operation performed. In case the operation is not listed the workman furnishes it in space headed "Operation." Instead of filling in time expended on the job in hours and minutes, the workman crosses the time he started and the time he finished the job, the reckoning of the time being done in the paymaster's department. Employees in all departments "punch" in and out on clocks or time recorders, and the clock slips are sent daily to the paymaster's department. The total time reported on labor cards by each man for the day is checked with the time registered by him on the clock.

CHARGES TO DEPARTMENTS.

The total charges to Plant and Standing Orders, Figs. 37, 38 and 39, are posted to sheets of the same size and ruling as the one shown in Fig. 36, but headed with department numbers, and all Standing Order numbers itemized, as illustrated in Fig. 40.

The heading "Own Charges" may be interpreted to mean expense charges in the department only, such as foreman and tool setters; "O. D. Charges" are charges by other departments. It will be noted that figures opposite S. O. 520 on Fig. 40 agree with totals for the same departments, Fig. 36.

CHARGES TO DEPARTMENTS FOR SUPPLIES.

Charges of supplies to Standing and Plant Order numbers are made up from Material Delivered Cards, Fig. 9, which are received from the Stores Department. As these cards are received they are sorted to department numbers. Each department's charges are then sorted to Standing and Plant Order numbers and filed in a tray with guide cards bearing department numbers and subdivided to groups of numbers of Standing and Plant Orders. Totals are taken off monthly by means of an adding machine and are posted to departments, Fig. 38.

The manner in which Monthly Analyses and Reports are made will be shown in the next and concluding article.

NEW ORLEANS NOTES.

FROM A SPECIAL CORRESPONDENT.

JUST at present there is the usual lull in local Hardware circles that follows the rush of fall deliveries. The local retailers have filled their largest household Hardware demands, and are preparing for the winter trade that will begin in full force after December 1. Exporters are endeavoring with more than their usual energy to extend territory into the West Indies and to Central America and Mexico. From all this alien territory there have been visitors and possible purchasers in the city within the last few days.

In the city there has been considerable differentiation in the comparative degrees of prosperity manifested by the several branches of the Hardware business. The recent decline in the price of the base iron and steel goods has been largely anticipated by the local jobbers, with the result that they have met the issue with smaller stocks on hand than for many months in the past. The jobbers report, however, that the anticipation of the decline has had little effect upon the demand from the country and the country towns.

A review of the autumn deliveries into the country round about New Orleans shows that the Implement lines have increased in volume approximately 25 per cent., with the grinding and crushing articles for use in handling feed stuffs leading. Plowing and land clearing Implements promised, earlier in the season, to lead; but certain circumstances interfered to render this impossible. In the cotton belt there has been scarcity of labor, and the planters have had their hands full attending to the harvest. In the rice belt the same has been the case. With the sugar planters the weather has been too dry for successful plowing. It is claimed by the Implement men, however, that the delay in plowing will only result in heavier sales during the spring, and in larger orders to the drummers who are now in the country. Plowing can be put off from fall to spring, but when spring comes the work must be done or the land will lie out.

The feature of the entire fall business has been the increase in the sales of Feed Stuff Implements and Tools. The sugar planters, the rice men and the cotton men have all made excellent hay and corn crops, and in consequence they have been compelled to purchase more than the usual supply of such goods. More than this, there has been a campaign of education waged, in an effort to induce the farming classes through the Gulf States to be-

come more nearly self supporting. This has resulted in the paying of more attention to these side issues of the Southern planters' work.

Mill supply goods have also increased their sales approximately between 20 and 25 per cent. The saw mills, however, have recently ceased to purchase much. Most of the mills are running full time, but others, through Mississippi, have been forced to cease operations owing to the extreme drought, which has caused a failure in the water supply. The sugar houses have been well fitted for the season, but are not purchasing the usual amount of incidental supplies. This is due to the shortage in the sugar crop, which is variously estimated to be from 30,000 to 50,000 tons of the finished product. The increase in the number of rice mills in the Louisiana-Texas rice belt has opened a splendid field in this line, which several of the local houses have made haste to seize.

In export Implements there has been considerable increase, especially in the shipments to the West Indies. The experiments in cotton seem to have proven successful, and the Southern Pacific steamships and the New York & Porto Rican Line have been carrying heavy orders of Implements for the last six weeks. The last vessel which sailed took a large consignment to Havana for reshipment to the southern side of the island.

A. Baldwin & Co. report that exports to Mexico are increasing, particularly to the territory devoted to cotton, just across the American boundary. It would seem, all through Mexico, that sentiment is veering again to New Orleans as a source of supply; and that New York and the Vera Cruz steamers are being neglected. It is said that more satisfactory arrangements have been made with the Central American steamship lines for the exploitation of New Orleans goods. The local agencies of the large Northern and Western manufacturers have also made joint arrangements with the railroads and the steamship lines for improved through transportation facilities, which will obviate the delay and expense of extra handling in New Orleans yards, and enable goods to go from car to ship with the least trouble.

Stauffer, Eshleman & Co. reported recently the first shipment of Builders' Hardware to Porto Rico, and the firm state that the prospects are for a continued sale of similar goods into that market.

Woodward, Wight & Co., who lead the local ship chandlery business, as well as stand forward in seeking export trade in the General Hardware lines, say that there has been as much proportionate increase in sales of Chandlery as in any other line. Instances are quoted of increased sales to purchasers who usually do all their business across the Atlantic and merely obtain the incidental necessities in New Orleans.

Builders' Hardware is just now busier than almost any other line. The country towns are purchasing heavily, as are the plantations. In New Orleans there have been 85 building permits issued in the last two weeks, and the city salesmen are locating orders for the necessary goods. The decrease in the price of metal goods and the advantage thus given brick and stone buildings have added impetus to the sales of structural Hardware and iron.

The city retailers are in much the same position as the jobbers and the wholesalers. Tools, Household Supplies and Builders' Hardware have been leading lines. The household business was strongest in October and early November—those being the moving months—and just now there is a lull, which is expected to vanish shortly before the winter trade, which always brightens up after December comes in.

NATIONAL TWIST DRILL & TOOL COMPANY, Detroit, Mich., have installed a complete outfit of modern tools for the manufacture of Reamers, Cutters and Special Tools, and will soon commence building special machinery for manufacturing all kinds of Twist Drills. Following are the officers of the company: Wm. H. McGregor, president; P. J. Hoenschied, vice-president and manager; A. W. Ehrman, treasurer; Chas. R. Becker, secretary. Mr. Hoenschied has had 20 years' experience in this line of manufacture, and is well qualified for the management of the plant.

BRITISH LETTER.

Offices of *The Iron Age*, HASTINGS HOUSE,
NORFOLK ST., LONDON, W. C., November 14, 1903.

The Week's Hardware Trade.

IN spite of loud complaints from all quarters about trade depression and the coming American invasion, it is a noteworthy fact that the last returns of the Board of Trade for the month of October are eminently satisfactory. Both for the month and the ten months the total exports are in advance of anything ever before recorded, even including the boom year 1900. But, encouraging as this is, it is to be feared that the grumbling has some foundation in the dullness of the home trade. Throughout the country there is an uneasy feeling, and this manifests itself in a continued policy of caution among consumers, while the spending power of the population is undoubtedly restricted. Uncertainty as to the foreign competition to be faced in the near future checks the iron and steel trade. For makers of steel billets and sheet and tin plate bars the future is far from bright, and unless some change takes place very soon it is difficult to see much hope for them. As regards Cutlery, the trade taken all round is extremely quiet for the time of year. The situation is thus described by one in the trade: "Some houses are doing fairly well, and others very badly. We should now be in the middle of the throng, and there is no throng at all. For best Pen and Pocket Knives there is a good demand, but much less is being done in general spring Cutlery, and men are seeking work. There is nothing like the amount of business going on in Table Cutlery that is usual in November." As a rule, the home market is quiet all round. A few firms who have clung very determinedly to the American market are doing better trade, and are keeping their people more fully employed than for some years past.

Owing to the increased requirements in galvanized sheets of Germany, the Dutch East Indies, the Philippines, Mexico, Chile, Uruguay and Canada, the exports reached during October a total of 31,361 tons, as against 28,626 in October of last year.

Plowing by Motor.

At a recent plowing match, in which 137 Plows competed for prizes, the chief interest centered in the plowing by motor, and one is set wondering whether this does not herald an industrial revolution. The Ivel Motor, hauling three-furrow Plow, did twice as much work in half the time as a four-horse Plow, which only did half an acre in four hours. I happen to know, through private sources, that this experiment in motor plowing is financially well supported, and we shall hear a great deal more of it in the near future.

Cutting Lumber by Electricity.

I hear that successful experiments have been made in various forests of France in cutting trees by means of electricity. A platinum wire is heated to a white heat by an electric current and used like a saw. In this manner the tree is felled much easier and quicker than in the old way; no sawdust is produced, and the slight carbonization caused by the hot wire acts as a preservative of the wood. The new method is said to require only one-eighth of the time consumed by the old sawing process. If any ingenious American can improve on this it would seem to have money in it.

The Trade in the Persian Gulf.

Great importance is attached by those in the know to the departure from Odessa of the steamer "Trouvor" for the Persian Gulf. She carries nearly 4000 tons of Russian manufactures, which are to be sold in markets in Southern Persia at prices little above cost, with a view to the creation of a demand for Russian goods. This is the third attempt which has been made in this regard, the other two having proved failures. But on this occasion the proprietors of the ship, it is said, have received a subvention of about £10,000 from the Czar's Government, and this action is the more interesting because it is contemporaneous with the announcement from

St. Petersburg that a Russian guardship is to be permanently stationed in the gulf.

Chinese Preparations for War.

In view of the rumors which are again in circulation as to the seriousness of the situation in the Far East, it is significant to note that much comment is to be heard in both official and other quarters here upon the fact that considerable arms shipments to China are taking place just now. Not only arms but the machinery for making them are being sent out, and the assumption is that China is quietly making preparations for what is considered the inevitable conflict between Russia and Japan, it being regarded as more or less certain that in the event of such a conflict China could not be a silent or inactive spectator.

Irritation in Manila.

A curious report has reached London to the effect that much dissatisfaction has arisen among importing merchants at Manila from the conduct of the customs authorities at that port in handing over to the San Luis Exhibition Board patterns, samples and invoices of imported goods supplied to them in the ordinary course of business. These appear to have been exposed for the information of the public. At a meeting of the Manila Chamber of Commerce held on September 23 a resolution was adopted denouncing the publication, by the assistance of the customs officials, of such private information as a breach of confidence and requesting a discontinuance of the practice. It was stated at the meeting that this had in no case been sanctioned by any of the importing firms interested. The Manila Chamber is an international body, and the protest, though not settling forth any specific complaints of injury arising from this practice, appears to have received general support among the merchants. No information is supplied as to the effect of the representations to the Government of the Philippine Islands.

Trade Prospects in Morocco.

Some months ago I sent you a copy of a concession in literal translation of a tract of ground just beyond Point Juby, which lies immediately south of Morocco. It may interest your readers to know that this particular concession has now been purchased by that enterprising young Frenchman, Jacques Lebaudy, who now styles himself "The Emperor of the Soudan." He is generally thought over here to be engaged on a perfectly mad scheme, but as a matter of fact all his arrangements have been unusually well thought out, and the money spent may prove to be a good investment for the reasons which I then gave. During a recent visit to Morocco I became convinced from information obtained that, sooner or later, this territory would fall under the dominance of the French Government.

This last week a deputation waited upon Lord Lansdowne, the British Minister of Foreign Affairs, asking him to safeguard existing trade, and enable Great Britain to share in the future expansion of Morocco, which the deputation deems to be inevitable. It was pointed out that French intervention in Algeria, Madagascar and Tunis had operated adversely to British interests. All that the British Foreign Minister could promise was that the utmost efforts would be made to obtain guarantees as to equality of opportunity between the nations in future commercial dealings with Morocco.

Notes on South Africa.

A German merchant of Johannesburg writes to the *Rheinisch Westfälische Zeitung*: "The Transvaal and Orange River Colony, in the first place, and Rhodesia in the second, should be regarded as markets *par excellence* for Agricultural Machinery and Implements. The demand for this description of goods will doubtless continue a large one for many years to come, and the erection of iron and machinery works in these parts (though both iron and coal are easily available in the Transvaal) is not probable in the near future, in view of the rates of wages and the dearth of living."

The great growth in the South African Cycle trade is apparently not fully appreciated by many exporters.

During the three years, 1900, 1901 and 1902, there were imported into South Africa an average of two Cycles for every seven units of the white population, male or female, between the ages of 15 and 40.

The following notes on the type of Cycle required may help American exporters. In the first place, it is absolutely necessary, from the nature of the country and the industrial conditions prevailing there, that the machine imported should be of superior quality, adapted to the peculiarities of climate, exceptionally strong, and equal to the hardest wear. Again, plunger instead of rim brakes are almost universally demanded, and more than 90 per cent. of those imported are fitted with free wheels, while Dunlop tyres with smooth treads are found to be most suitable for the climate. Bad roads—or absence of roads, properly so called—are the feature of the country, and it is not infrequent that the cyclist meets with ruts so deep that the pedals often scrape the ground. This circumstance calls for an increase in the height of the machine at the cranks, and those so built have a far better chance of selling than those in which this provision has been overlooked. The Cycle is rather the necessary means of individual transport, or the handy vehicle for business purposes, in proof of which is the fact that the number of Ladies' Cycles imported is in very small proportion to the total.

As the charge for Cycle repairing in South Africa is high, the machines imported should be of exceptional quality, thus necessitating as few visits as possible to the depot. Makers who cater for the market should see that their agents are well supplied with essential, or patented parts, as the necessity, in case of break downs, of procuring special fittings militates against the sales of machines in which such parts exist. On the all important subject of packing, the system of skeleton crates seems to be the most suitable for export to South Africa, and is preferred by importers there.

Another line which South Africa just now is buying is wood working machinery. The Defiance Machine Works of Defiance, Ohio, U. S. A., and of 71 Queen street, London, E. C., are supplying their wood working machinery, through the agency of business houses in Cape Colony, Natal and the Transvaal, to nearly 800 purchasers, and they believe their trade can largely be extended in the near future. Their standard line of wheel making machinery is coming into active demand in that country, as a consequence of which they have resolved to make special efforts to bring their patents in wheel and handle making machinery more closely to the attention of users throughout South Africa. To this end it has been deemed necessary to open an office in that country, and shortly a practical man from headquarters, who thoroughly understands their enormous range of labor saving appliances, will be established in one of the larger centers. The company, in fact, intend to handle their South African business in the same way that the connection in Great Britain is handled. Meanwhile an immense amount of literature dealing with the multitude of specialties manufactured at the Defiance Machine Works is being circulated in South Africa.

CONSULAR REPORTS ON FOREIGN TRADE.

British Guiana.

THE ordinance imposing a tax on commercial travelers visiting British Guiana, passed last year, has been repealed, and no obstacles now exist to that efficient method of promoting trade.

A French Commercial Expedition.

A large steamship, the "Isle de France," has been chartered by leading French exporters for a cruise among the principal markets in the Levant—i.e., along the shores of the Mediterranean—to meet the competition forced on them by Germany and other industrial nations, a trade that France has had almost a monopoly of until recent years. The expedition was planned to leave Marseilles October 18 for Constantinople, Broussa, Mytilene, Smyrna, Saloniki, Piræus and Athens.

Trade Journals in Germany.

There is probably no country in the world which has as many trade journals as Germany. The trade journal is a powerful organ for bringing producer and consumer and wholesaler and retailer together.

What the trade journal accomplishes for the interstate commerce of any one country, certain journals now in circulation are accomplishing for international commerce. The American trade journals on file in the various consulates, chambers of commerce and other merchant organizations in Europe are unquestionably furthering the interests of our export trade. The advertisements in them may not always produce business at the outset, but they lead to inquiries along certain lines of manufacture which, if carefully answered, lead to the desired trade openings abroad.

Effect of the Canadian Preferential Tariff Law.

The imports into Canada from the United Kingdom and from the United States since the passage of the Canadian preferential tariff law of 1897 were as follows:

Year ended June 30—	Imports for consumption (including bullion and specie).	
	From the United Kingdom.	From the United States.
1897.....	\$29,412,188	\$61,649,041
1898.....	32,500,917	78,705,590
1899.....	37,060,123	93,007,166
1900.....	44,789,730	109,844,378
1901.....	43,018,164	110,485,008
1902.....	49,206,062	120,814,759
1903.....	65,007,080	137,605,195

Wire Netting Needed in Portugal.

United States Minister Charles P. Bryan, at Lisbon, reports to the Department, for the benefit of American manufacturers interested, that Portugal seems to offer an excellent market for Doors and Window Sashes of Wire Netting, which are unknown in that country. The swarming there of flies, mosquitoes and other insects nine months of the year would appear to make the demand for such protection universal.

NEW ENGLAND HARDWARE DEALERS' ASSOCIATION.

THE NEW ENGLAND HARDWARE DEALERS' ASSOCIATION will observe their annual ladies' night and banquet at the United States Hotel, Boston, December 9. The committee have secured Rev. William T. McElveen, Ph.D., of Boston as the principal speaker of the evening. Mrs. Elisha J. Neale of Lowell, Mass., will respond for the ladies. Music will be furnished by the Copley Square Orchestra, songs by Hugh Campbell, baritone soloist, and Miss Miriam Carver will give readings. An attractive programme has been prepared and a very enjoyable evening is promised. The arrangements for the meeting are in charge of the following committee: Samuel H. Thompson, Myron H. Tarbox, D. Fletcher Barber, John B. Hunter and James A. Farless.

PRICE-LISTS, CIRCULARS, &c.

Manufacturers issuing new catalogues or price-lists are requested to send to THE IRON AGE two copies—one for the Catalogue Department in the New York Office, and one for the Iron Age Library of Trade Literature in London.

S. F. BOWSER & Co., Fort Wayne, Ind.: Descriptive catalogue of the Bowser Self Measuring Factory, Railroad and Navy Oil Tanks and Cabinets, for handling all classes of Lubricating and other Oils.

THE JOSEPH DIXON CRUCIBLE COMPANY, Jersey City, N. J.: Illustrated pamphlet devoted to explaining the more important uses of Dixon's Graphite.

FORD AUGER BIT COMPANY, Holyoke, Mass.: Patent Augers and Bits. An illustrated catalogue and price-list shows Augers and Bits, Car Bits, Ship Augers, Machine Augers and Bits, Screw Driver Bits.

ASPHALT READY ROOFING COMPANY, 136 Water street, New York: Folder devoted to the merits of the Arrow brand of Asphalt Ready Roofing. This is made with gravel and sand surface.

ELLWOOD IVINS, Philadelphia, Pa.: Price-lists of Cold Drawn Seamless Low Carbon Steel Tubing, Seamless Tool Steel Tubing and Seamless Aluminum Tubing.

AMERICAN STEEL & WIRE COMPANY, Chicago, Ill.: Catalogue under date of November, 1903, devoted to Wire Rope and Fittings, canceling their issue of April, 1900, covering the same goods. Wire Rope of every description is manufactured by the company.

STANDARD COMPANY, 29 Haverhill street, Boston, Mass.: Illustrated circular devoted to their line of Egg Beaters, including Nos. 0, 3, 6, 10 and 15.

CLARK BROS. BOLT COMPANY, Milldale, Conn.: Illustrated price-list relating to Bolts, Set Screws, Coach Screws, Cold Punched and Hot Pressed Nuts, Rivets, Washers, and special forms of many of the foregoing goods.

IWAN BROS., Streator, Ill.: Circulars relating to Serated Hay Knives, Revolving and Ventilating Chimney Tops, Drain Cleaners, Post Hole and Well Augers.

S. CHENEY & SON, Manlius, N. Y.: Gray Iron Founders. An illustrated price-list is devoted to Barn Door Rollers, Chimney Doors, Clothes Reels, Mauls, Wagon Bolsters, Stable Fixtures, Counter Legs, Cold Air Fans, Registers and Thimbles, Molasses Gates, Plow Castings, Chimney Tops, Sash Weights, Sink and Wash Tray Legs, Heating Stoves, &c.

THE J. D. WARREN MFG. COMPANY, Chicago, Ill.: An attractive folder devoted to the story of "A man who saved the total wreck of his business and made it great by the adoption of the Warren system of store display."

COLUMBUS CHAIN COMPANY, Columbus, Ohio: Illustrated catalogue No. 11, devoted to Coil, Dredge, Cable, Brake, Switch, Check and Safety Chains; Trace, Butt, Stage and Harness Chains, and Special Chains.

REQUESTS FOR CATALOGUES, &c.

The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

REQUESTS for catalogues, price-lists, quotations, &c., have been received from the following houses:

FROM R. A. REYNOLDS, who has just opened up in business at Stamford, Conn. Mr. Reynolds handles Builders' Hardware, Wood Workers' Tools and Pocket Cutlery.

FROM D. W. HOUSLEY, Mt. Auburn, Ill., who has lately bought the Hardware business formerly conducted by Rohan & Phillips.

FROM ALLEN & Co., who have recently succeeded Woehler Bros. at Zaring, Iowa.

FROM FRANK PARRISH & SON, Hamilton, Mo., who have lately entered the retail business in Shelf and Heavy Hardware, Stoves, Tinware, &c.

FROM C. A. UNGER, formerly of Greensburg, Mo., who has recently purchased a Hardware store in Brashear.

FROM FULLER & PORTER HARDWARE COMPANY, who have entered the Hardware, Stove and Harness business at Blue Mound, Kan.

FROM EATINGER HARDWARE COMPANY, Orient, Iowa, who have lately embarked in the Hardware, Paint and Lumber business.

FROM SCOTT BROS., who have succeeded Sullivan Mer-

cantile Company, Sullivan, Ind., dealers in Shelf and Heavy Hardware, Stoves and Tinware, Buggies, furniture, &c.

FROM ANDERSON HARDWARE COMPANY, Anderson, S. C., wholesale and retail dealers in Hardware, Agricultural Implements, Paints, &c.

FROM W. O. SESLINE, who has succeeded the general Hardware firm of Sesline & Powell at Shipshewana, Ind.

FROM THE OWASSO HARDWARE COMPANY, Owasso, I. T., who have lately been organized to carry on the Hardware, Stove and furniture business.

MISCELLANEOUS NOTES.

Star Tinner's Snips.

The International Cutlery Company, Fremont, Ohio, are manufacturing tinner's snips with solid steel handle and base, and upon the base is hand forged and welded an edge of highest grade tool steel. The extra welded steel blade, it is explained, enables the manufacturers to make the edge like a cold chisel—hard and biting without being brittle.

Drop Forged Weldless Swivel.

Wilcox, Crittenden & Co., Middletown, Conn., are making a new drop forged weldless swivel, with a special drop forged washer on which the head is upset, and by means of indentures in the washer the head is fastened to it, so that the wear comes entirely on the washer. The swivel works much easier than that formerly manufactured by the company, who state that it gives better service as the drop forged work is naturally better than the old style and provides much more perfect working surfaces. The $\frac{3}{8}$ -inch swivel of the new type is now being made, and the company will soon be prepared to furnish swivels up to $\frac{7}{8}$ -inch. The swivel has many uses, including ships' rigging, buoys, boring chains and other like purposes.

Three-Minute Bread Maker.

Landers, Frary & Clark, New Britain, Conn., and 52 Chambers street, New York, have recently put on the



Fig. 1.—Three-minute Bread Maker, Uncovered.

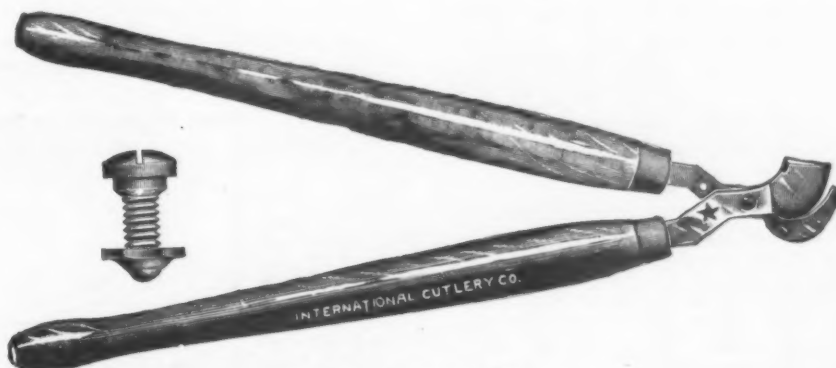
market the Universal bread maker, here shown. The apparatus, which is exceedingly simple and easy to clean, is made of heavy tinned plate and sheet steel, and all parts are tinned. It is 10 inches high, 11 inches across the top, and weighs $6\frac{1}{2}$ pounds. Its purpose is to thoroughly and easily mix, knead and provide a receptacle for raising the dough for a batch of bread, without the

hands coming in contact with the dough, which is objectionable from a hygienic and sanitary point of view, as well as that of soiling the hands. In use the liquid is first put in the receptacle and then the sifted flour. Three minutes' continuous turning of the crank, to which is attached a U-shaped tinned iron rod, as seen in Fig. 2, will thoroughly distribute the moisture throughout the entire mass, thus allowing every particle of starch to expand and become digestible. The dough after this uniform and thorough mixing is left to rise in the pail, which, with its cover, is well suited to the purpose. After the mass has risen a knife blade is run around the outer edge of the dough to separate it from the pail, and the

Bennett. The capital of the business has been increased, and they expect soon to lease a larger building, which will be remodeled and brought up to date in its appointments. This will enable them materially to increase the stock carried.

New Buckeye Pruning Shears.

The pruning shears shown herewith have an adjustable bolt fitted with a tension nut, so that the pruner can be taken apart and sharpened. The shears are hand forged, with solid forged steel blades, and while strong enough to cut the largest branches that will go between



New Buckeye Pruning Shears.

crank turned a few times until the dough forms a ball around the kneader, when, by loosening the binding lever of the cross piece, the dough can be lifted out of the pail by taking off the cross piece. The dough is then pushed off the rod, cut up and put into baking pans. This process is not only quick and free from the objection to hand kneading, but does not press or mash together the particles of flour which the process of raising is designed to separate to facilitate digestion. The device systematically mixes and kneads all the particles of flour, lightly separating and holding them apart until the moisture and leavening ferment have been uniformly introduced

the blades, it is explained that the shears can be instantly adjusted so that they will not buckle when cutting shrubbery, thus making the pruner a tool of general utility for the orchard, garden and nursery. The pruners are made in No. 1, full length 26 inches, and No. 2, full length 30 inches, by the International Cutlery Company, Fremont, Ohio.

Reliance Washing Machine.

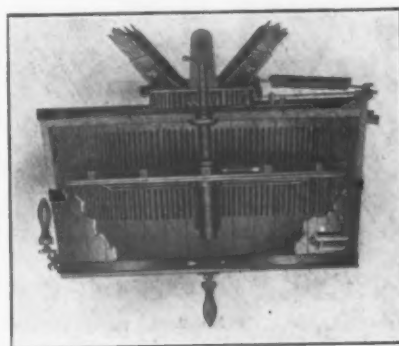
Fawkes Mfg. Company, Minneapolis, Minn., are offering the washing machine shown herewith. The mechanical construction of the machine is referred to as constantly changing the position of the clothes, exposing all parts alike to the rubbing surfaces, and as washing the finest fabric without breaking a thread and the heaviest blanket with ease. The operator sits in a chair, turns the tub about one-third of a revolution, and the heavy coil spring, which engages at each extreme point, helps



Fig. 2.—Sectional View of Internal Mechanism of Bread Maker.

throughout the entire bulk. It is also said by the manufacturers that after the dough has been thus prepared the baking process more easily bursts the granules of starch.

Elkel & Stempel, Aguascalientes, Mexico, have dissolved by mutual consent, George Stempel retiring. The business will be continued by Walter Elkel, under the style of Gualterio Elkel S. en C. Associated with Mr. Elkel are two special partners, A. B. Culver and Dr. C. L.



Reliance Washing Machine.

reverse the motion, which, it is explained, makes the machine easy to operate. It is pointed out that any garment can be washed clean without boiling, scrubbing, and without the use of destructive chemicals, hot water and soap being all that is needed; and that five minutes is the usual time required for washing a tub of clothes. The handles turn down out of the way when not in use; the tub has a full, open top, and the wringer can be placed on the tub anywhere on the circumference. The manufacturers state that the machine is built of the best material, by skilled workmen, and that every tub is fully guaranteed.

No. A1 Glass Cutter.

S. G. Monce, Unionville, Conn., is offering the glass cutter shown in Fig. 1, which is designed to fit the hand more perfectly than those previously manufactured by him. The cutters are all metal, the change being made in

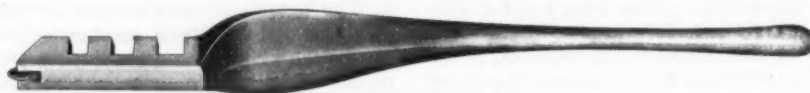
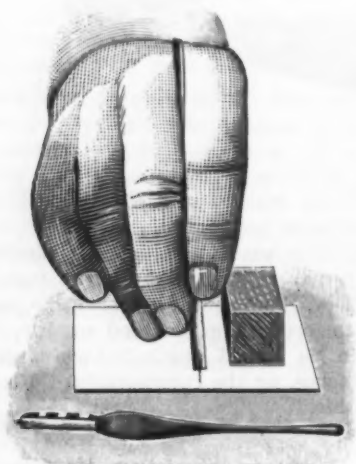
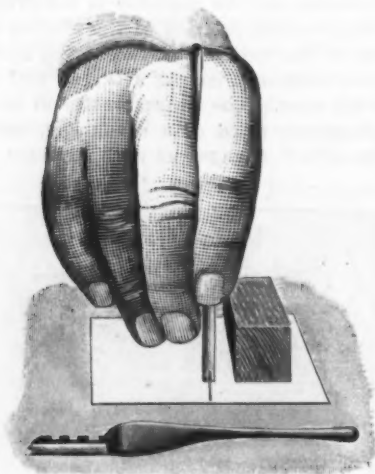


Fig. 1.—No. A1 Glass Cutter.

the contour of the handle. The difference in this particular can be seen by comparing the small illustrations of cutters Nos. 1 and 2 in Fig. 2. No. 2 represents the improved shape of handle, as shown in Fig. 1, while No. 1 is the shape previously made. The new cutter is intended to fit the hand and give to the wheel an even bear-



No. 1.



No. 2.

Fig. 2.—Two Positions in Glass Cutting.

ing with the wrist and arm carried naturally, and to parallel the straight edge without contorting the hand. Referring to the position of the hand in Fig. 2, it is explained that the hand shown in No. 1 is inclined at an angle by nearly the width of the finger, and that the grip is not so good as in No. 2, where the shank of the cutter is straight up and down, and the grip about perfect. The manufacturer states that the improvement was designed on lines suggested by years of experience in testing glass cutters, and that in working hour after hour at testing it was always an effort to keep the cutters in an upright position. Grip the improved cutter, he remarks, and it rights itself.

Ferno Heating Disk and Cooking Stove.

The Ferno Light & Heating Company, 153 Thirty-third street, Brooklyn, N. Y., have put on the market the perfected Ferno heating disk and cooking stove, here illustrated. The illustrations show two styles of the device

attached to straight wall gas brackets, such as are found in most buildings, by merely removing the burner, which is then replaced on the attachment, although the device can be as easily connected with other forms of gas fixtures. This construction enables the user to both heat and illuminate a room; or if at any time heat is not needed the consumption of gas can be stopped or regulated by means of the lever key immediately under the heating disk, the light burner being governed by the ring key nearest the gas burner and the supply for both determined by the flat key of the wall bracket. A match

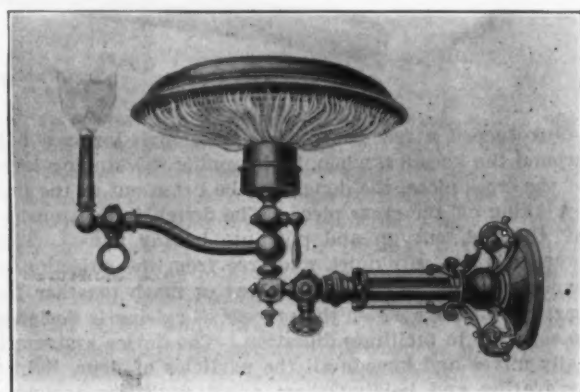


Fig. 1.—Ferno Gas Heater No. 1.

applied to the under or perforated side starts the heating disk, the light being turned down until the flame becomes blue, when the greatest heat is obtained. The manufacturers claim that the construction is such that but three-tenths of the volume of gas is consumed in a given period, the remaining seven-tenths being obtained from the atmosphere in the form of oxygen, which is made available by means of the air mixer below the disk. Some of the uses for which the makers recommend it are

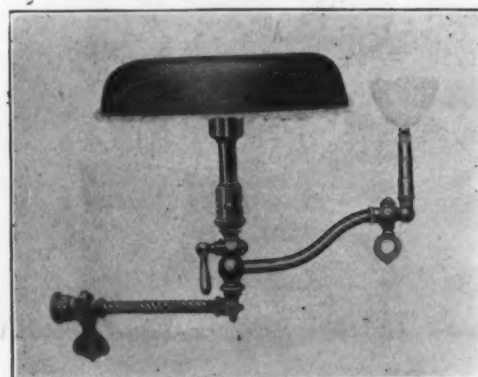


Fig. 2.—Ferno Gas Heater No. 2.

for bathrooms or sickrooms, where it is a great convenience for preparing food, especially at night; heating luncheons in factory, office or shop; when shaving; for traveling men, &c.

Clemens & Bird have succeeded Sparta Hardware Company, in the Hardware, Stove, Wagon and Buggy and Farming Implement business in Sparta, Mo.